AUTOMOTIVE INDUSTRIES

JUNE 1, 1953

AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE
ENGINEERING • PRODUCTION • MANAGEMENT

In This Issue... New Italian Cars · · · · Ford 50th Anniversary · · · · Opportunities for Shell Molding · · · · Automatic Equipment at De Soto Engine Plant · · · · Vehicles in Sweden · · · · Bus Fixtures

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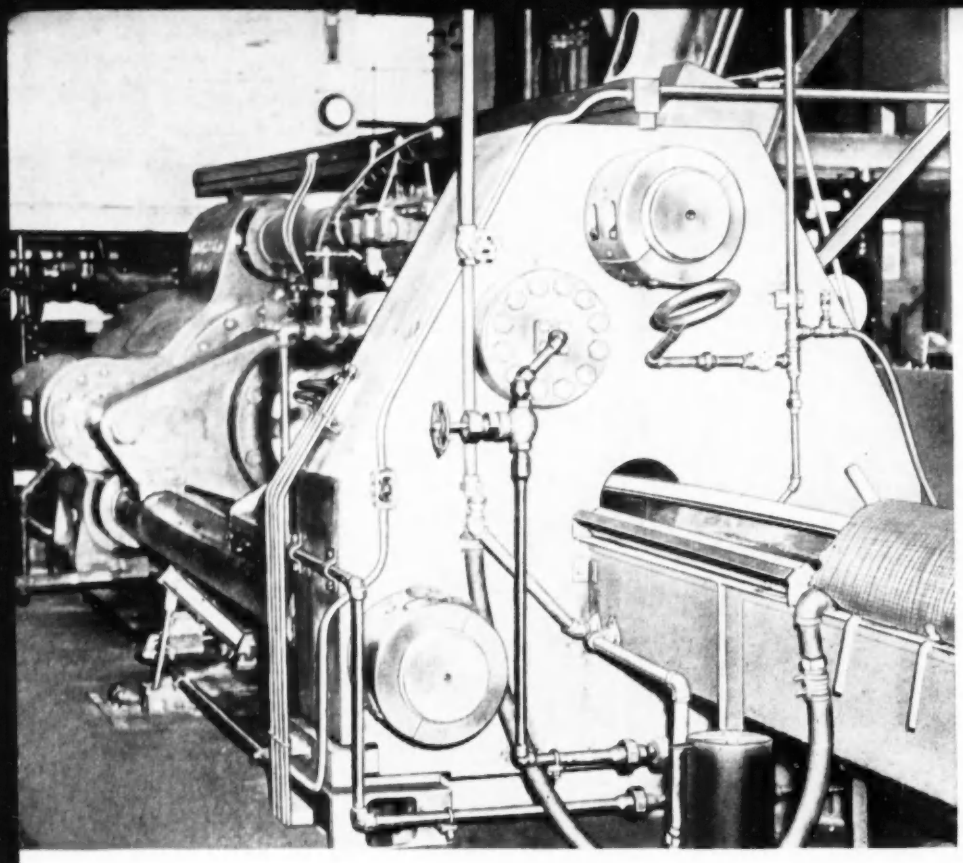
A CHILTON PUBLICATION



Puts squeeze on hydraulic press maintenance...

● Shown above is the 1250-ton hydraulic press used by the Light Metals Corporation of Grand Rapids, Michigan, for extruding variously shaped sections of aluminum. When this press was installed recently, officials gave the important hydraulic oil job to STANOIL Industrial Oil. They based that decision on their own experience with this outstanding oil.

That experience covered over four years' use of STANOIL in the hydraulic system of a 315-ton extrusion press. STANOIL has served continuously in this press without being changed or removed for oil maintenance. The hydraulic oil system has never been cleaned and has remained entirely free from deposits and varnish. Hydraulic operation has been efficient at all times.

The experience of the Light Metals Corporation is your assurance of STANOIL's ability to reduce hydraulic system maintenance to a minimum in your plant. This versatile oil will provide clean, dependable lubrication for such a variety of equipment as air compressors, reduction gears, and electric motors. The Standard Oil lubrication specialists will help you make the most effective use of STANOIL. Phone him at your local Standard Oil (Indiana) office. Or write, Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

STANOIL
TRADE MARK
Industrial Oil

What's YOUR problem?

D. R. Clay, of Standard Oil's Grand Rapids, Michigan, office, is the lubrication specialist who has helped Light Metals Corporation keep maintenance of hydraulic units at a minimum through use of STANOIL Industrial Oil.

He is one of many Standard Oil specialists located throughout the Midwest. These men have the practical experience and special training to handle lubrication problems on any type of operation.

Take advantage of the service offered by the lubrication specialist nearest your plant. You can contact him easily by phoning your local Standard Oil Company (Indiana) office. With his help, find how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Air compressors . . . no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers . . . less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

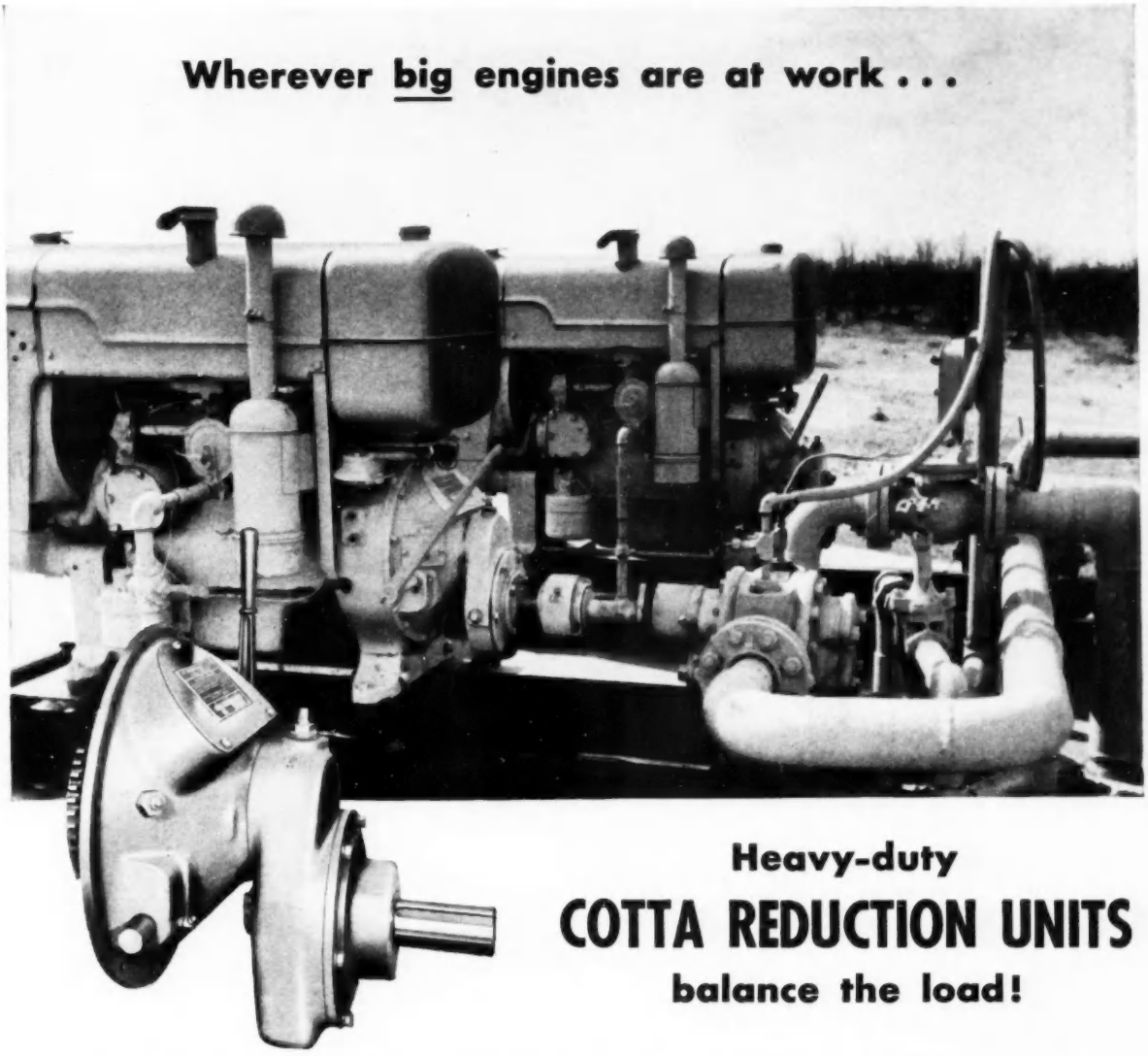
Steam turbines . . . freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings . . . rings function immediately on starting, less bearing wear.

Circulating and bath systems . . . one oil for a wide variety of jobs.

STANDARD OIL COMPANY **STANDARD** *(Indiana)*

Wherever big engines are at work . . .



Heavy-duty
COTTA REDUCTION UNITS
balance the load!

These powerful tandem engines pump crude oil from West Texas producing wells to an artery of trunk pipe lines which pour the precious "black gold" into the northern refineries.

To balance the high engine speeds with pump load requirements, a Cotta Heavy-Duty Reduction Unit is used on the main power take-off for each pump. This is a familiar assignment for Cotta Reduction Units, which set the standard in the petroleum industry for low-cost, high-output performance on drilling rigs, pumps and other heavy-duty equipment.

One of the reasons for Cotta's acceptance in the oil fields is the lasting protection built into the gears. Hard and wear-resistant on the faces . . . tough and shock-resistant in the cores . . . they stand up for the lifetime of the equipment, operate on continuous-duty schedules without strain, eliminate costly repairs and maintenance!

If you build cranes, locomotives, drillers, shovels, generators, pumps or other heavy-duty equipment, and you want a standard or "engineered-to-order" Reduction Unit — input torque ranging from 150 to 2000 foot pounds — Come to Cotta!

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA
HEAVY-DUTY
REDUCTION UNITS
"Engineered-to-order"

How Stainless makes the "Super Freighter" Super

5,000 to 8,000 Pounds Less Dead-Weight . . . 8 to 10 feet shorter, but more payload space than any standard motor truck of the same wheelbase . . .

These are characteristics of the "Super Freighter" . . . a self-propelled, large capacity trailer produced by the TWIN COACH COMPANY, Kent, Ohio.

Look at the 35-foot unit, shown here, with its body of 18-8 austenitic chromium-nickel stainless steel.

The 18-8 stainless permits use of thinner gauges *to cut dead-weight while increasing strength.* It also assures longer useful life, because chromium-nickel alloy steel has the toughness to withstand impacts and rough usage in loading and on the road.

Chromium-nickel stainless steels resist wear, abrasion from road dust, and the corrosive attacks of rain, sleet and ice, as well as corrosion from products carried. 18-8 assures long trouble-free performance, attractive appearance, cleanliness and economy.

You can forge, bend, weld, solder, punch, shear, draw and spin 18-8 stainless. Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

At the present time, nickel is available for the production of austenitic chromium-nickel stainless steels and other alloys containing nickel, for end uses in defense and defense supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.

"Super Freighter" Stainless Steel Van . . . built by TWIN COACH COMPANY, Kent, Ohio, has 33,000 lbs. payload capacity and weighs 17,500 lbs. net. Overall length, 35'. Width, 8'. Height, 12¼'. Tread, 7'-11¾". Turning radius, 39½'. Powered by FAGEOL-TWIN COACH engines of pancake design . . . originally developed for under-floor bus mounting . . . "Super Freighters" utilize standard FRUEHAUF trailers, including refrigerator and live-stock vans. In addition to use as cargo trucks, units can be easily outfitted as mobile hospitals, machine shops, field offices, stores-on-wheels, etc.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

AUTOMOTIVE INDUSTRIES

JUNE 1, 1953 VOL. 108, NO. 11

CONTENTS

FEATURES

NEWS PREVIEWS

DEPARTMENTS

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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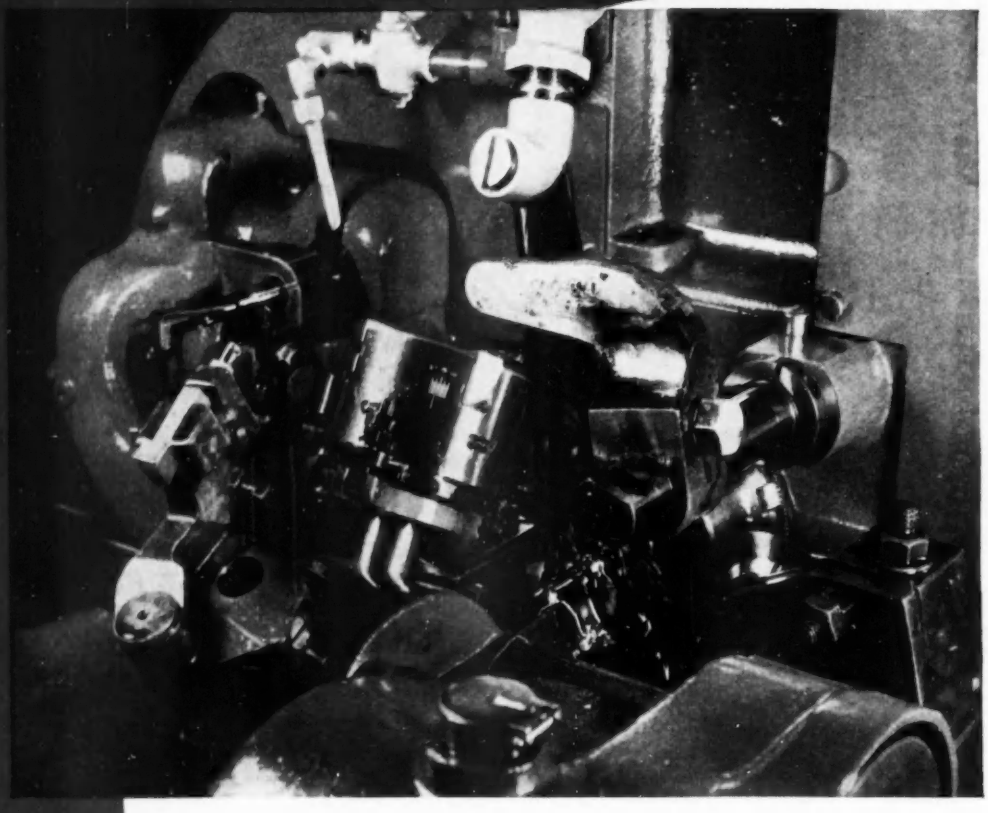
FIRST AID FOR FASTER MACHINING



ON ANY MACHINE, faster operation means greater production — and this is possible only with the right cutting fluid, properly applied. These conditions can be amply met with the aid of Texaco.

**There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to assure longer tool life, better finish, greater production—whatever the metal or your method of machining it.

**A Texaco Lubrication Engineer specializing in metal working will gladly help you choose the right cutting fluids for your jobs, help you in their proper handling and use.

Let Texaco help you do all your machining better, faster and at lower cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

FOR LARGEST TRACTORS

FOR THREE-JOINT STRINGS

FOR CRAMPED SPACE

FOR EASY INSTALLATION

Accurate, Dependable Steering Requires MECHANICS Precision

Row crop tractor manufacturers rely on MECHANICS Roller Bearing UNIVERSAL JOINTS for accurate, dependable steering — free from backlash. Stamped yoke, projection welded types make possible economical installation. Compact types fit snugly into cramped space and into strings of three joints — between the steering wheel and gear box. Let MECHANICS engineers help design efficient steering strings for *your* products.

MECHANICS
UNIVERSAL JOINT
DIVISION
Borg-Warner
2024 Harrison Ave.
Rockford, Ill.

MECHANICS
Roller Bearing BW
UNIVERSAL JOINTS

For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

Pacemakers on the *Jet* PROGRAM

The inception of Man-Au-Trol Vertical Turret Lathe started a new manufacturing era in the boring mill field.

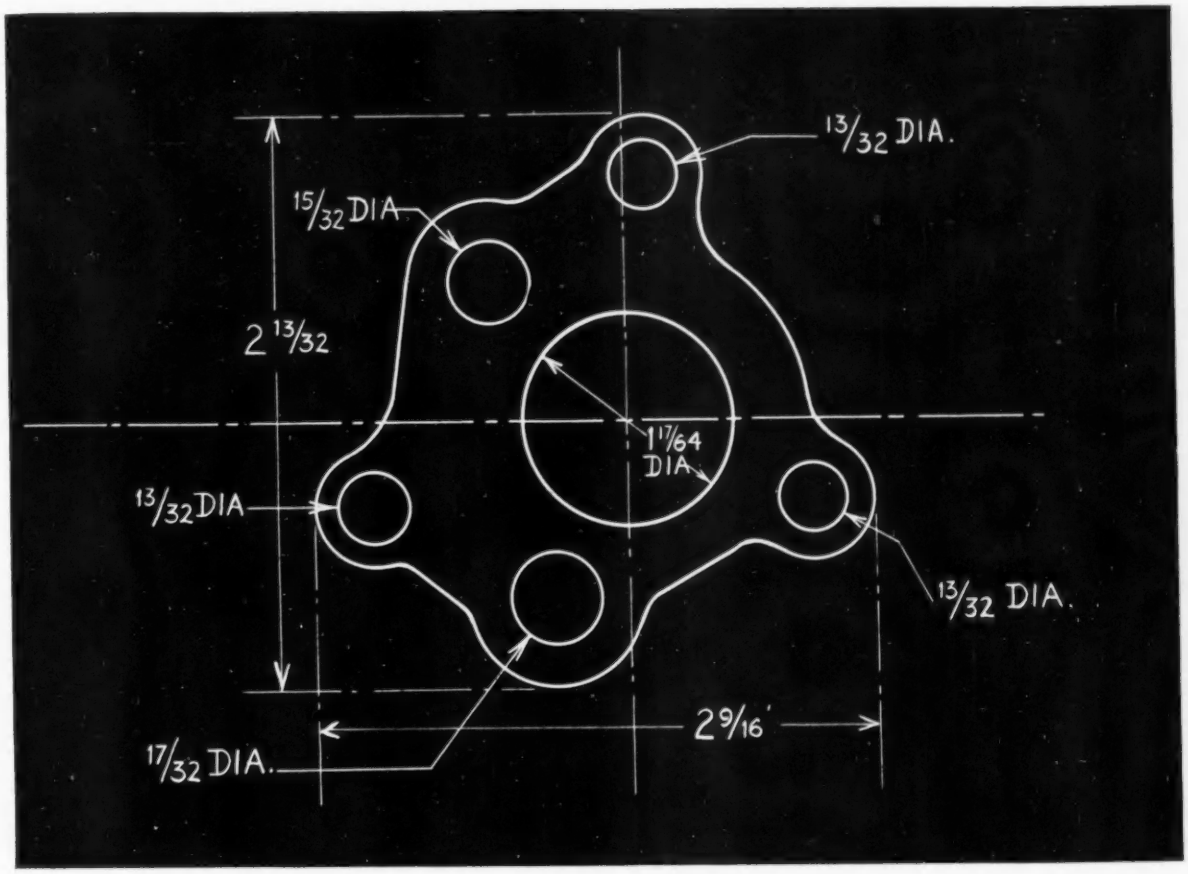
Man-Au-Trol manual or automatic control has taken the guess work out of previous manual operations on highly accurate repetitive work.

Automatic change of feeds and speeds at the proper instant, automatic change of direction of feed, automatic precision indexing of heads for succeeding operations — all contribute to the productive efficiency and minimum operator fatigue at a pace previously unobtainable in single spindle machines of the size and capacities of Man-Au-Trol.

For "set-ups" or shorter run jobs, manual operation is quickly available without disturbing the settings for the automatic cycle.

Learn about the manufacturing efficiency of this machine as applied to your work.

THE BULLARD COMPANY
Bridgeport 2, Conn.



Here's an economical seal for hot oil

When the automobile oil pump gasket shown above was made of treated paper, dealers reported excessive failures. The engine heat volatilized some of the gasket's binder and made the gasket dry out, shrink, and leak.

This manufacturer solved his gasket problem by switching to an entirely new kind of fiber gasketing—Armstrong's Accopac®. This new material has a rubber binder that's non-extractable and non-volatile. Accopac *can't* dry out, shrink, or crack in service.

Fibers locked in rubber. Each fiber in an Accopac sheet is covered with a coating of latex *before* the sheet is formed. The fibers are completely locked in rubber. That's why Accopac isn't noticeably affected by humidity changes . . . why you can store Accopac gaskets for months and still have them fit and seal perfectly.

Compressibility, crush resistance. Finely ground cork particles give Accopac high, uniform compressibility. Even on a light stamped metal flange, Accopac seals without distorting the flange between bolts. Accopac also gives you unequalled protection from leaks caused by crushing, which may occur under the high pressures found at local high spots along a flange. Accopac withstands 100,000 psi, while conventional fiber sheets often rupture at about 25,000 psi.

Several different varieties of Accopac are available, and more are being developed. Both cellulose and asbestos fibers are used as base materials. You can get Accopac in sheets, rolls, ribbons, or die-cut shapes. For samples, call your nearest Armstrong office or write Armstrong Cork Company, Industrial Div., 7006 Imperial Ave., Lancaster, Penna.

ARMSTRONG'S ACCOPAC

EATON FREE-VALVES

are Free to Rotate in *BOTH* Directions!

Result:

Valves last many times longer. Performance records prove it!

Eaton Free-Valves are genuinely "free"—free to turn at random, in either direction, during a major portion of the lift-cycle.

This free-floating action wipes stem and seat free of deposits; keeps a film of oil on stem and guide surfaces. Scuffing is prevented, wear is reduced. Hot-spots due to local leakage are eliminated.

Eaton Free-Valves can be applied to practically any engine without design changes. Our engineers will be glad to discuss Eaton Free-Valves with you.

EATON

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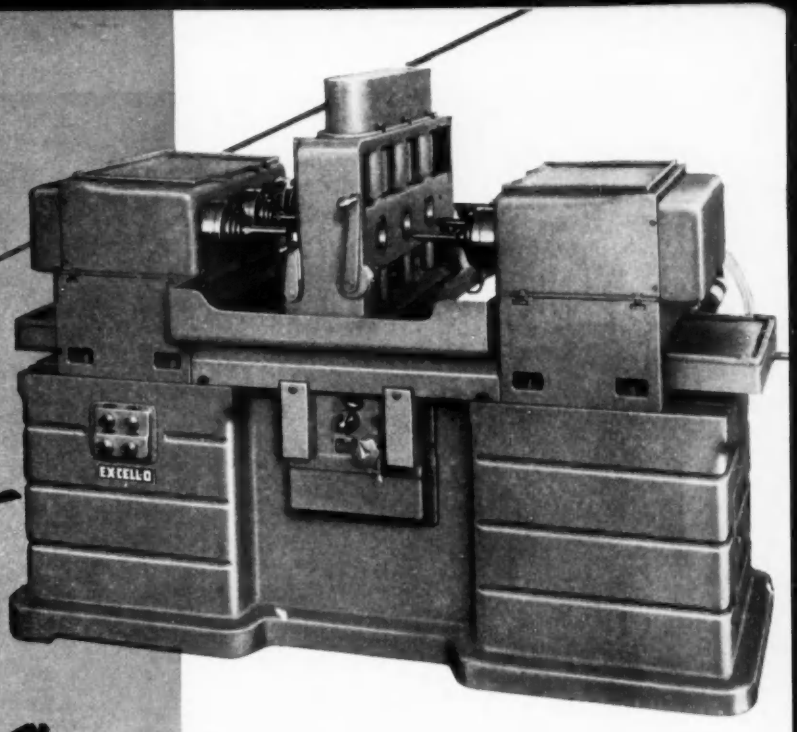
General Offices: CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

EATON PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings • Springlites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Style 17 Ex-Cell-O Precision Boring Machine equipped with new, inbuilt motor spindles for semifinish and finish-boring of wrist pin holes in automotive pistons.



Vibration-Free Boring

NEW INBUILT-MOTOR SPINDLES ON EX-CELL-O PRECISION BORING MACHINE ASSURE FAST, ACCURATE FINISHING OF PISTON PIN HOLES

Wrist pin holes in automotive pistons are given exceptionally fine surface finish by this Style 17 Precision Boring Machine equipped with inbuilt-motor spindles. Diameters are held within .0003" total tolerance. The inbuilt motor positively eliminates any vibration that might originate in belts and pulleys.

The thin walled parts are held firmly, yet without distortion in a fixture which provides perfect alignment for bores through both bosses. Interchangeable locators are provided to accommodate two sizes of pistons. This machine both semifinishes and finish-bores the pin holes. Production rate is high.

For further information on the many uses to be made of Ex-Cell-O Precision Boring Machines, see your local Ex-Cell-O representative or write today for Bulletin 31205.

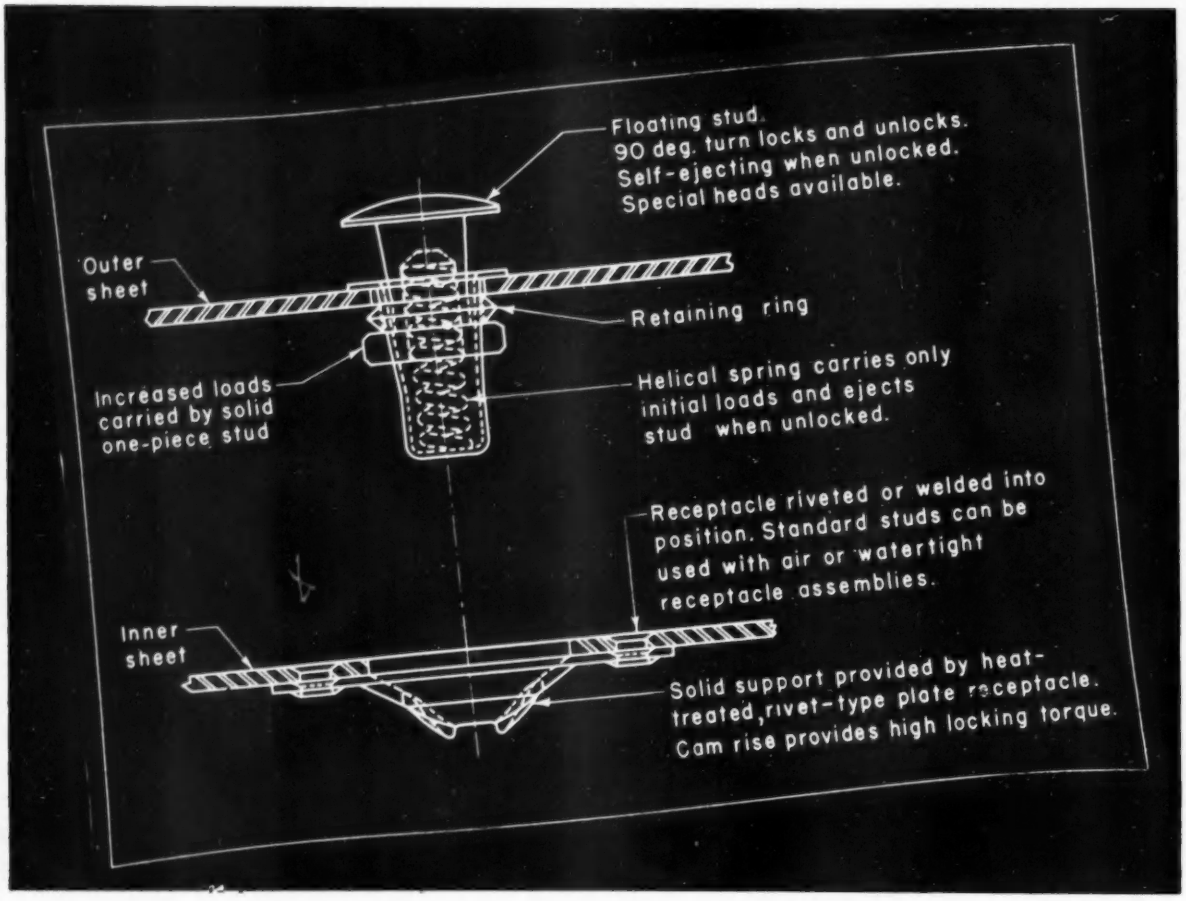
The machine table feeds to the left for semifinish-boring, then to the right for finish-boring, assuring uniform stock removal for the finishing cut. New inbuilt-motor precision boring spindles are rigid and smooth running. Coolant is manifolded through the covers on both sides of the pistons.

XLO
EX-CELL-O for PRECISION

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD TIME AND SUPPLIES • DRILL JIG BUSHINGS • DAIRY EQUIPMENT • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS

53-21



HOW QUICK-LOCK CUTS FASTENING COSTS

A glance at the drawing shows the advantages of QUICK-LOCK's efficient design. QUICK-LOCK speeds up the mounting and demounting of detachable panels, works equally well on curved or straight sheets.

QUICK-LOCK is adaptable to many different fastening applications in the aircraft, automotive, railroad, electrical and appliance fields. Let Simmons engineers help you cut assembly costs. Write for literature and samples today.

SIMMONS FASTENER CORPORATION · 1749 No. Broadway, Albany 1, New York

Simmons

QUICK-LOCK
SPRING-LOCK
ROTO-LOCK
LINK-LOCK

FASTENERS THAT IMPROVE PRODUCTS AND REDUCE ASSEMBLY COSTS

Are You Using Special Alloy Steels for Standard Alloy Jobs?

An estimated 95 of every 100 civilian and military jobs that require alloy steel can be handled effectively with AISI standard alloy grades. Generally speaking, the exceptions that call for special alloy grades are those jobs involving resistance to heat, corrosion, or low-temperature impact.

You Benefit by Using Standard AISI Grades

The vast majority of engineering applications for alloy steel simply involve heat treating to required levels of strength or hardness. For these applications standard alloy steels will quench out to practically any combination of properties. And the over-alloying of a small section will add nothing to its properties, and will make it more susceptible to quenching cracks.

The chemical ranges of standard grades usually fall within closer limits than those of special steels. Standard methods of heat-treatment can be employed and the resulting property ranges can be predicted to a closer degree.

You can ordinarily get better deliveries of standard grades. This means that you can operate with smaller inventories and with less capital tied up in slower-moving special grades.

At Bethlehem we manufacture special-analysis alloy steels as well as the entire range of AISI standard alloy grades and standard carbon steels. We are obviously in a position to make unbiased recommendations. Our metallurgists are experienced in solving problems that pertain to all types of steel. Call on us for advice at any time.

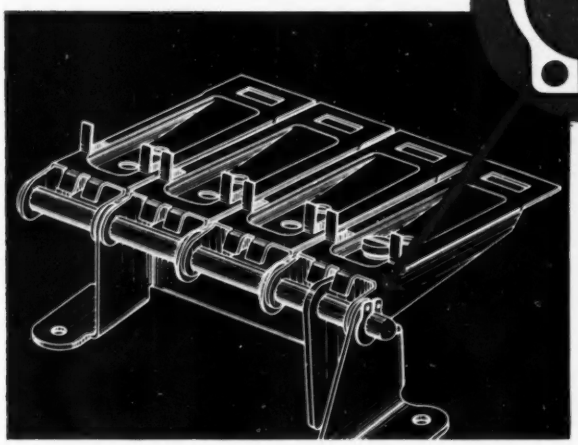
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

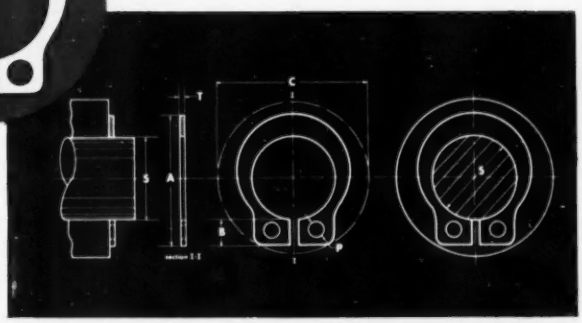
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

New Waldes Truarc GRIP Ring requires no groove, holds fast by friction, can be used over and over again





Ring # 5555		5555-12	5555-13½	5555-18	5555-25	5555-31	5555-37
SHAFT DIAMETER	Fract. Equiv. S	1/8"	—	3/16"	1/4"	5/16"	3/8"
	Dec. Equiv. S	.125	.136	.187	.250	.312	.375
	TOL.	±.002	±.002	±.002	±.002	±.003	±.003
RING DIMENSIONS	Thickness T	.025	.025	.035	.035	.042	.042
	TOL.	±.0015	±.0015	±.002	±.002	±.002	±.002
	Length A	.268	.285	.364	.437	.553	.626
	Lug B	.078	.078	.097	.097	.141	.141
	Hole P	.042	.042	.042	.042	.078	.078
	Min. Ring Clear C	.33	.34	.44	.50	.67	.73
Approx. Ultim. Thrust Load (Lbs)		20	20	25	35	50	60

The Waldes Truarc Grip Ring is a new, low cost fastener that provides a positioning shoulder secure against moderate thrusts or vibration. Installed on a straight ungrooved shaft, the Truarc Grip Ring can be assembled and disassembled in either direction with Truarc pliers.

The Grip Ring can be installed tightly against a machine part in order to take up end-play. The basic Truarc design principle assuring complete circularity around periphery of the shaft and the ring's unusually large radial width combine to exert considerable frictional hold against axial displacement. The ring can be used again and again.

Find out what Waldes Truarc Retaining Rings can do for you. Send us your drawings. Waldes Truarc engineers will give your problems individual attention without obligation.

SEND FOR NEW CATALOG

WALDES

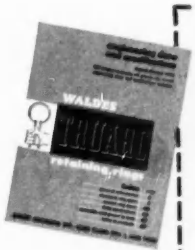
TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2,382,947; 2,382,949; 2,416,052; 2,420,921; 2,420,341; 2,439,789; 2,441,846; 2,455,165; 2,493,390; 2,493,383; 2,497,002; 2,497,803; 2,491,306; 2,509,081 AND OTHER PATENTS PENDING



Waldes Kohinoor, Inc.,
47-16 Austel Place, L.I.C. 1, N. Y. AY-065

☐ Please send me sample Grip-Rings (please specify shaft size _____)

☐ Please send me the complete Waldes Truarc catalog.

(PLEASE PRINT)

Name _____

Title _____

Company _____

Business Address _____

City _____ Zone ____ State _____

western Felt UNSEEN STAR of better products

Countless products have been improved by the use of WESTERN FELT. There is no substitute for its quality. Its efficiency in absorbing vibration, cushioning loads, providing oil-tight seals, keeping parts dust free, evening temperatures, filtering, lubricating, etc., is the highest obtainable.

Investigate Western Felt. Engineers expert in felt uses will gladly work with you to improve your product or industrial operation.

Sheet and roll felt manufactured for special purposes and to meet all S.A.E. and military specifications.

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Chicago 23, Illinois
Branch Offices in Principal Cities

MANUFACTURERS AND CUTTERS OF WOOL FELTS

Faster... For testing...

COMPACT, PORTABLE
BENCH-TYPE TESTING UNIT FOR RAPID HIGH and LOW TEMPERATURES

Primarily developed for a branch of the armed forces, this high and low temperature testing unit has a temperature range from -80° F. to +185° F. Rapid temperature pull-down to -80° F. requires 30 minutes or less. Heat application is accomplished through reverse cycle refrigeration. Hazards of open heating elements are eliminated. Test chamber dimensions are 12"x12"x12" and the overall dimensions are 50" long, 26" high and 20" deep. Approximate weight is 450 pounds. The unit is compact and is entirely self contained. Controls are simplified and easy to operate. Equipped with air-cooled compressors, the unit is quiet in operation. Cabinet is of stainless steel with all controls visible. A blower is provided for even distribution of temperatures and greater testing accuracy. The door illustrated is a latch type door providing for complete removal from the cabinet. Holes may be drilled for electrical contacts.

This is one of the many examples of WEBBER engineering skill and another of the many firsts built by WEBBER in the low temperature field.

Write for more complete information:

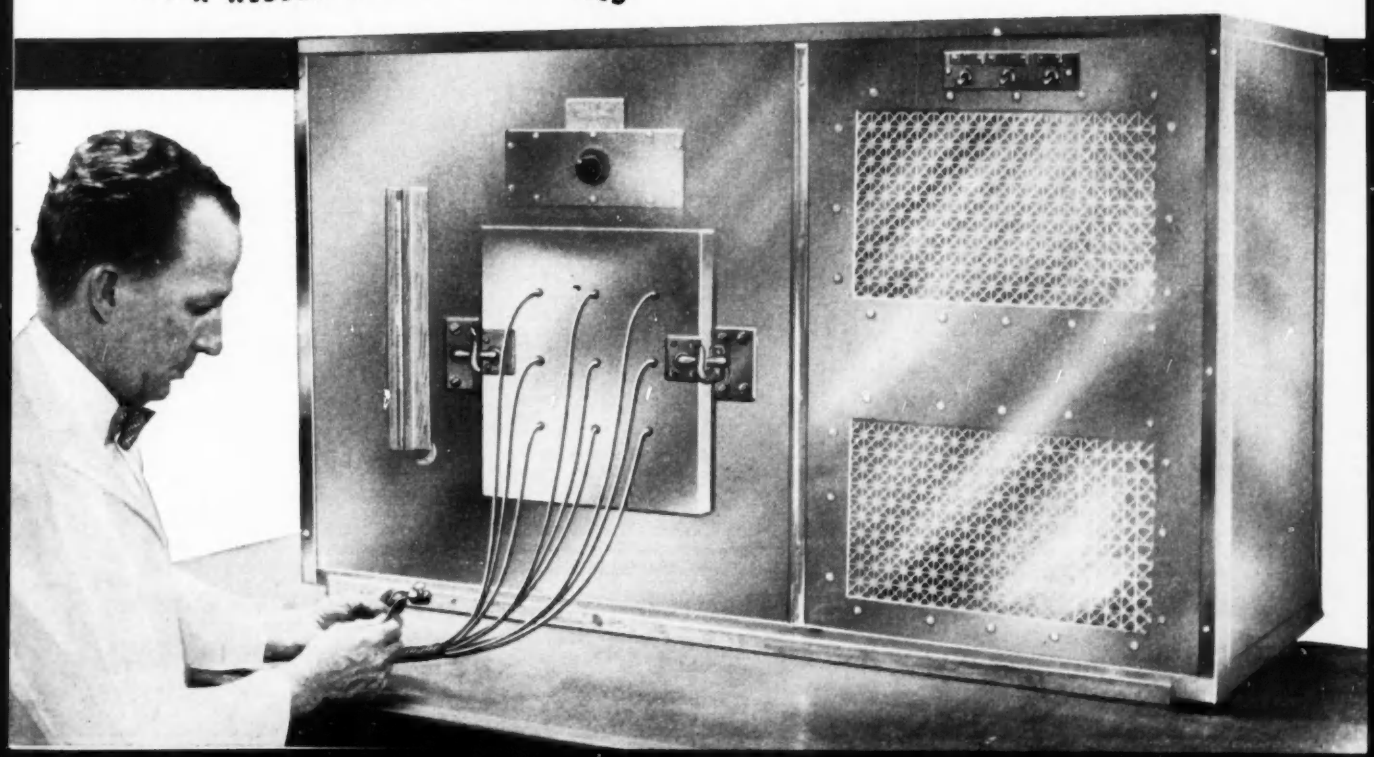
INDUSTRIAL FREEZER DIVISION
WEBBER MANUFACTURING COMPANY, INC., 2742 MADISON AVENUE, INDIANAPOLIS 3, INDIANA
(Formerly Webber Appliance Co., Inc.)

WEBBER
TRADE MARK

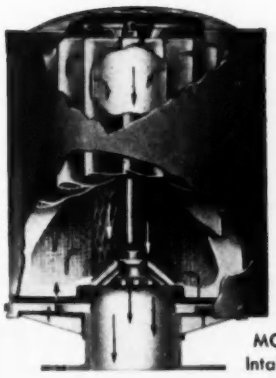
COMPLETE TEMPERATURE RANGE
TESTING UNITS

LOW-TEMPERATURE
INDUSTRIAL FREEZERS

THERE'S A WEBBER UNIT FOR EVERY NEED



BEST ENGINE PROTECTION MONEY CAN BUY!



MODEL D
Intake Filter

STAYNEW INTAKE FILTERS

STAYNEW INTAKE FILTERS keep shutdowns and repairs at an absolute minimum. Industrial engineers everywhere know that Staynew's *positive protection* lengthens engine life. They may cost more than ordinary intake filters, but with Staynew, you're assured of engines operating at top performance years longer. Staynew Intake Filters' extreme efficiency protects vital engine parts without carefully held maintenance schedules. And, efficiency actually increases with use. They're efficient over a wide range of loads, not affected by temperature changes, there's no oil carry over and no oil blow-out on free air unloading compressors. To keep equipment young *longer*, always specify Staynew.

Write today for Intake Filter Bulletin S.I.F.

Representatives in Principal Cities

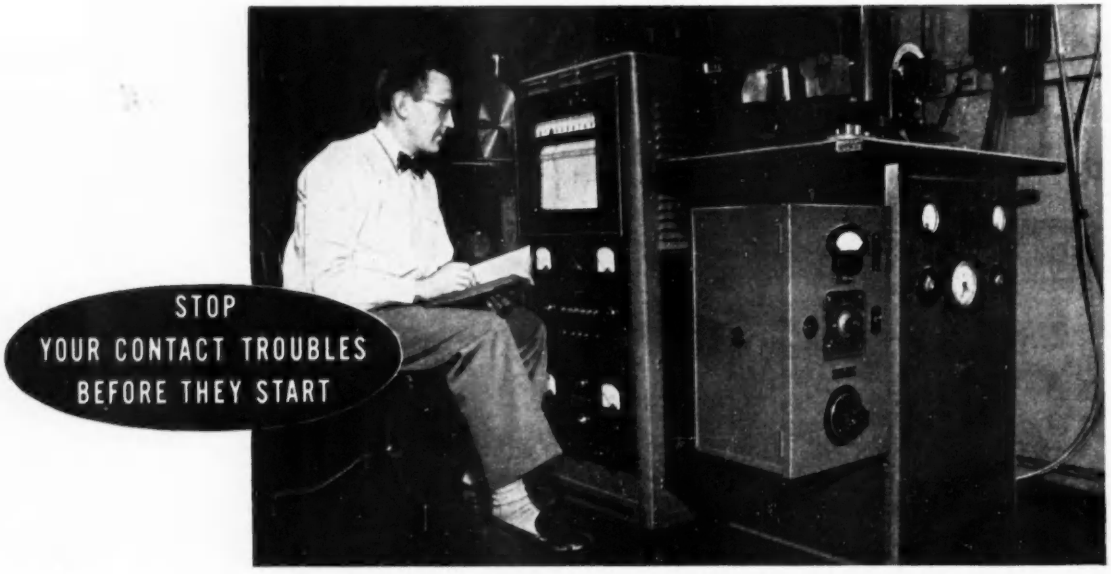
DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER

CORPORATION

85 Centre Park Rochester 3, N. Y.

ALL TYPES OF FILTERS
FOR EVERY INDUSTRIAL NEED



X-ray diffraction equipment in the Mallory Contact Engineering Laboratory. It is so sensitive it will identify contaminating films of less than a hundredth of a micron.

Less Than a Hundredth of a Micron!

The slightest trace of contaminating films on contact surfaces can be identified by X-ray diffraction equipment.

In a contact, trouble can be a lot of things. The paper used in packaging, the type of glue on sealing tape, insulation on a wire, atmospheric conditions . . . are just a few of the many things that can deposit a contaminating film on contact surfaces.

Because we have the equipment to identify contaminating films, we can track trouble to the source and correct it. This same X-ray diffraction equipment is also used in the development of new contact materials, by identifying unforeseen formations that may develop during production processes. It is used in life test work to study gradual changes taking place.

This is but one example of the complete facilities that are ready to go to work on your contact problems . . . whether it is a simple button contact or complex contact assembly that is involved. If you would like to improve the contacts in your products or produce them at lower cost, get in touch with us at your first opportunity. Our engineers will be glad to talk to you . . . answer your questions.

Expect more . . . Get more from **MALLORY**

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

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MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:
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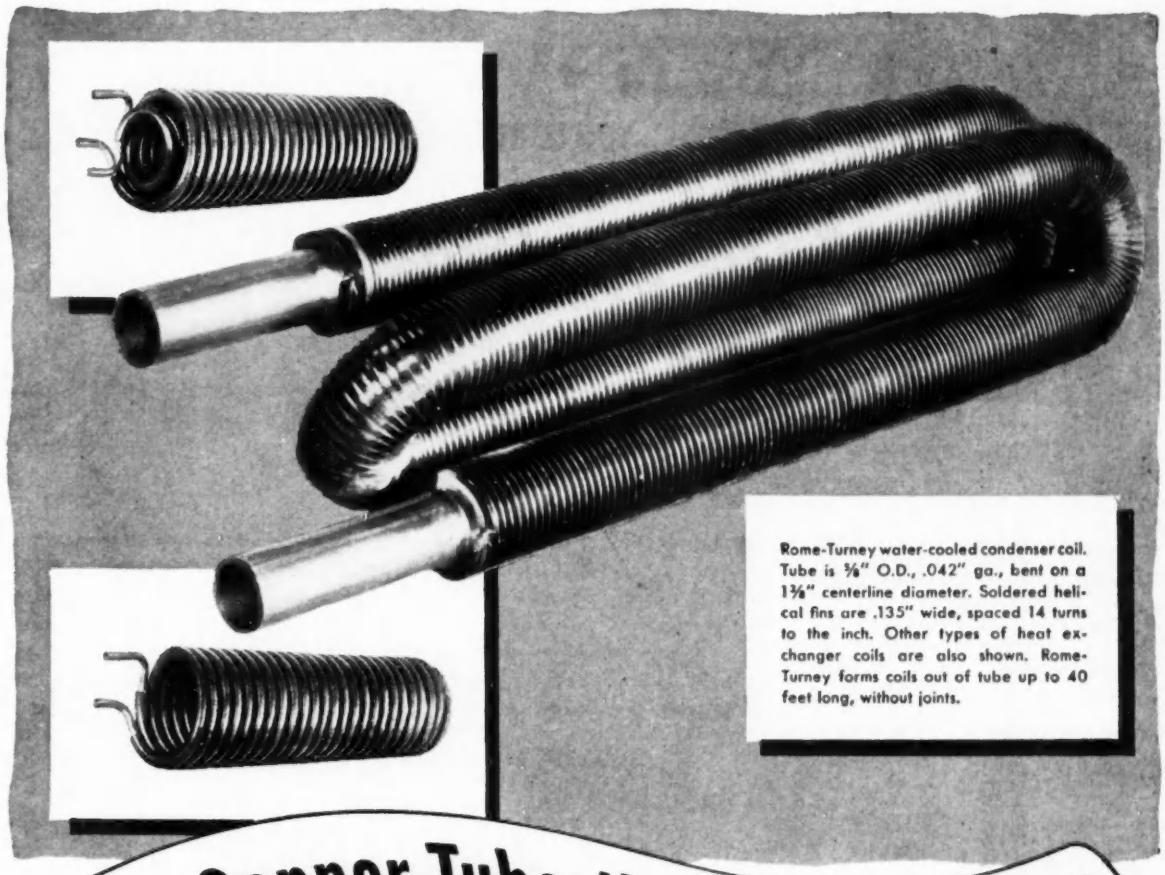
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO. INC., INDIANAPOLIS 6, INDIANA



Rome-Turney water-cooled condenser coil. Tube is ⅜" O.D., .042" ga., bent on a 1⅜" centerline diameter. Soldered helical fins are .135" wide, spaced 14 turns to the inch. Other types of heat exchanger coils are also shown. Rome-Turney forms coils out of tube up to 40 feet long, without joints.

For Copper Tube that can be BENT

Rome-Turney sees REVERE

Most of the Revere Metals are fabricated by usual methods into conventional products. Some of them, however, appear on the market in forms that are unusual and possess special advantages. Take these helical-finned copper coils produced by the Rome-Turney Radiator Co., Rome, N. Y. It takes extra skill to produce coils with such small radii. The company can produce the coils shown on a commercial basis, for use in air conditioning apparatus, air compressors, and general heating and cooling applications where compactness plus high heat transfer rates are essential.

How it is possible to make such tight turns is Rome-Turney's secret. Revere does not share in it, nor does Revere want to reveal a secret of its own, which is how we turn out copper tube in a special bending temper for an application such as this. All we can say is that the two methods dovetail very nicely. If you need copper tube that can be bent easily, and offers you as well the advantages of corrosion resistance, high heat transfer, easy joinings, see Revere. We also make copper pipe, tube in copper alloys, aluminum alloys, and electric welded steel tube. If required, the Technical Advisory Service will gladly collaborate with you, as it has with Rome-Turney, on selection and specification matters. Get in touch with the nearest Revere Sales Office.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

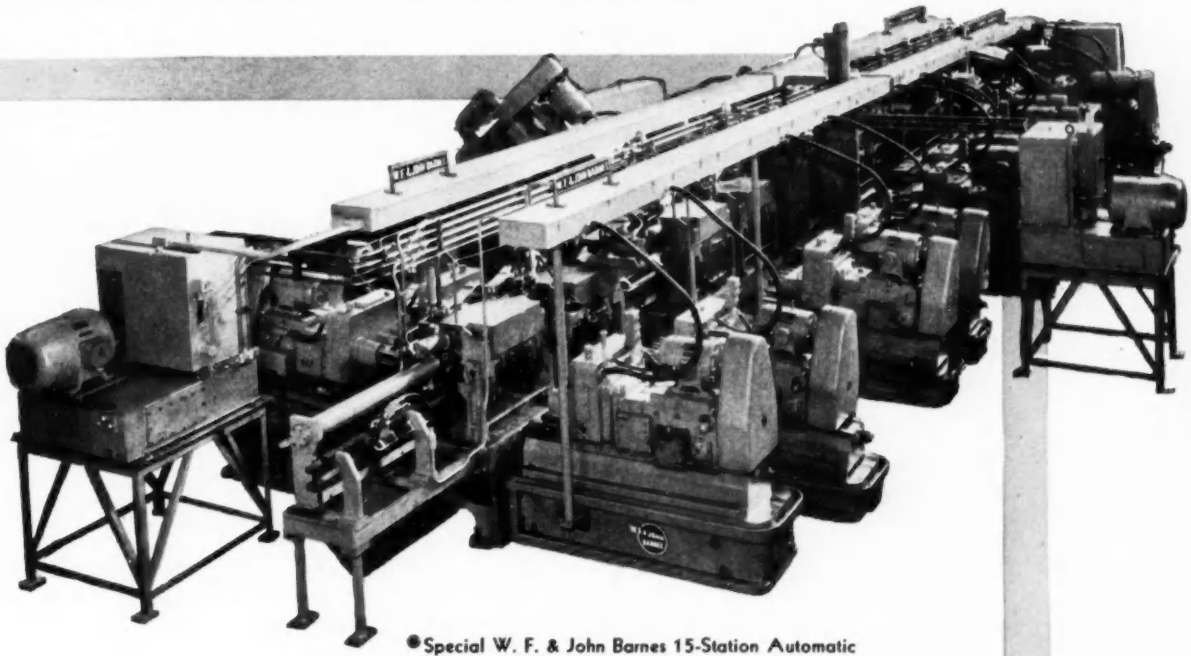
230 Park Avenue, New York 17, N. Y.

• • •

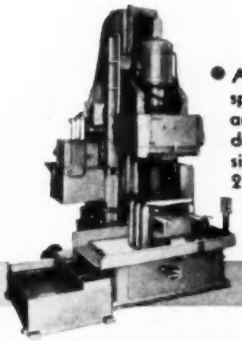
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

AT W. F. & JOHN BARNES



● Special W. F. & John Barnes 15-Station Automatic "Progress-Thru" Machine built for an automobile manufacturer for machining cylinder heads. A total of 78 machining operations are handled automatically at a gross production rate of 117 pieces per hour. The entire unit, including hydraulic and electrical circuits, designed for easy accessibility.



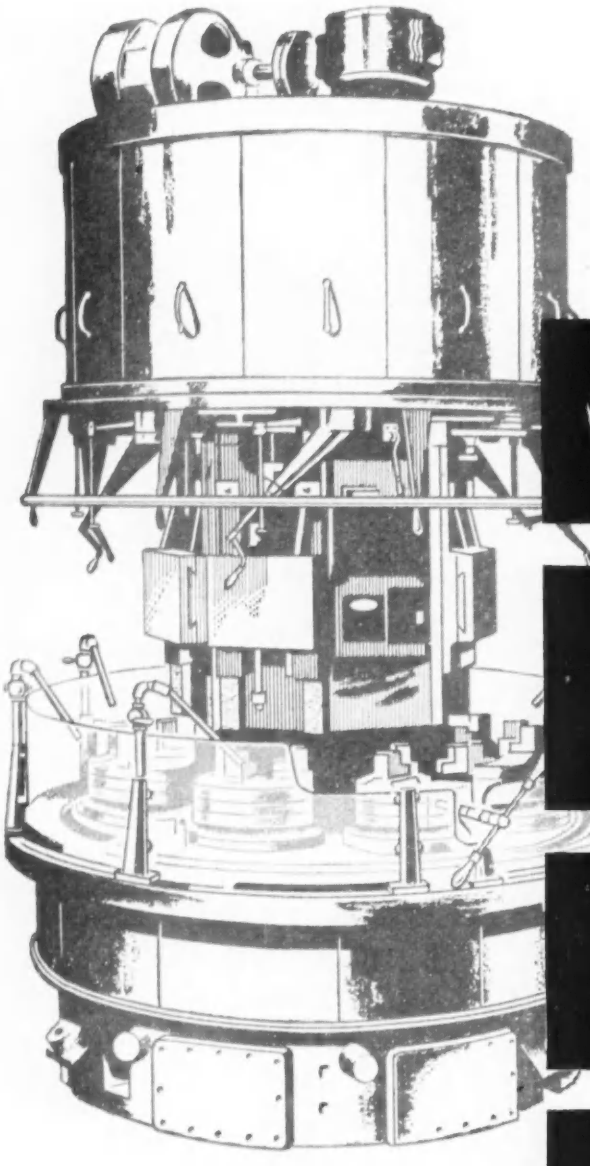
● A typical small multiple spindle machine designed and built by Barnes — drills 40 — .332" holes simultaneously. Produces 27 pieces per hour.

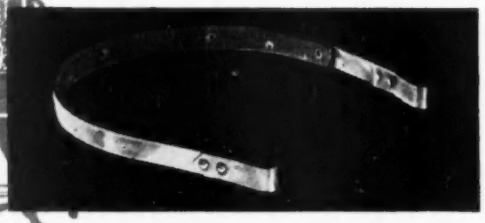
Write for Free Data

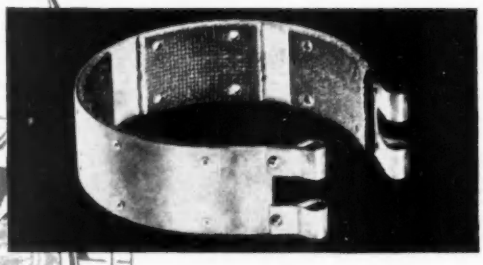
● Ask for free booklet "Coordinated Machine Engineering" describing the scope of Barnes machine tool building service. Illustrates and describes modern machines and mass production techniques.

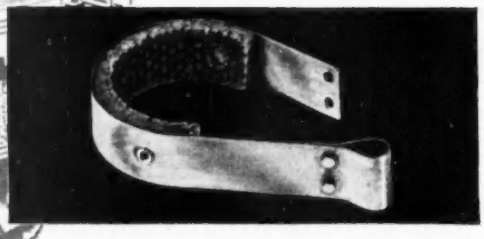
W. F. & JOHN BARNES COMPANY • 312 S. WATER STREET, ROCKFORD, ILLINOIS

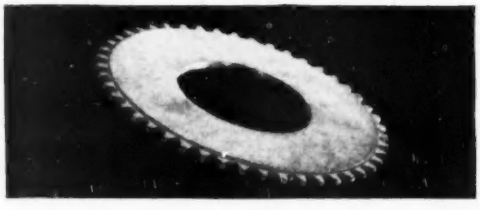
AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

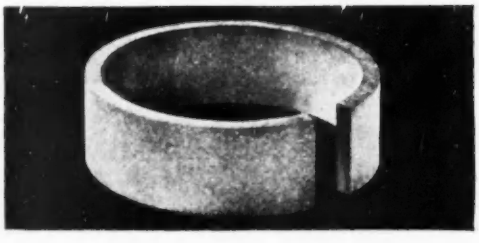










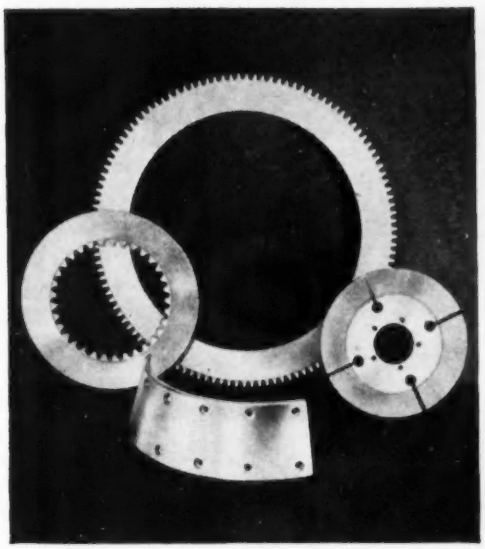


This multi-spindle vertical chucking lathe requires three entirely different types of friction materials for three completely different applications. R/M supplies all three, in five part numbers, saving the manufacturer the trouble of having to go to several sources to satisfy his requirements.

THE TRADE-MARK THAT SPELLS PROGRESS IN FRICTION MATERIAL DEVELOPMENT!

The story at the left typifies that of the many manufacturers who have chosen to make Raybestos-Manhattan their single source of supply for friction materials. R/M offers the distinct advantage of an exceptionally wide range of top quality products. Outstanding results are achieved because R/M works with countless combinations of different types of friction materials . . . including woven and molded asbestos, semi-metallic materials, and sintered metal parts.

If you are making or designing a product which requires friction materials, talk to your R/M representative. You will find he can work from samples, from designs on paper, from figures on horsepower developed combined with the desired performance characteristics. Behind him stand all the facilities of the world's largest maker of friction materials.



There's an increasing need for sintered metal parts. This is particularly true where applications call for close tolerances or operating conditions require immersion in oil. R/M is producing these parts as fast as industry needs them.

Write for your copy of the R/M Engineering Bulletin. It describes and illustrates many R/M friction materials for aviation, agriculture, the automotive industry and others.

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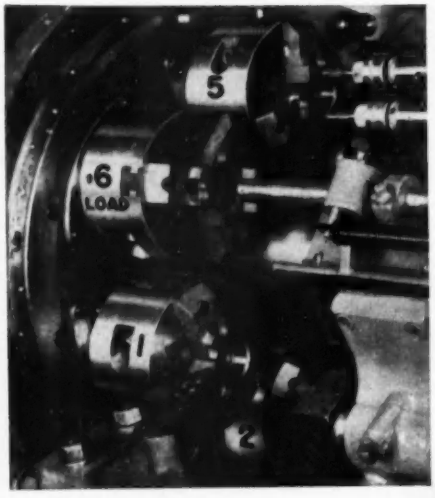
R M

FIRST IN FRICTION

ASK BAIRD ABOUT IT!

HIGH PRODUCTION TOOLING

A BAIRD CASE HISTORY



View of machine from front.

1
Finish turn flange O.D. (3.44"). Rough turn hub dia. Rough face flange and hub.

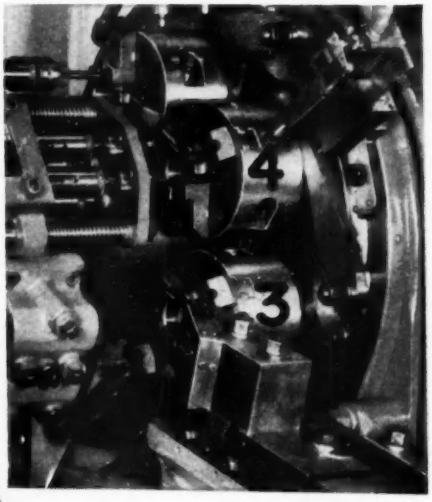
2
Chamfer I.D. Chamfer flange dia. and hub.

3
Finish turn hub, finish face flange and hub.

4
Drill and c'sink 4 holes — 23/64" dia. drill x 29/64" dia. C'sink, sub land drills. (Work held stationary when drilling.)

5
Tap 4 holes 7/16" — 14NC — 3. (Work positioned, held stationary, lead screw operated.)

6
Unload and load.



View of machine from rear.

The part . . . before and after machining.

FINISHING A CAST IRON PULLEY HUB...

PRODUCTION
Cycle time 23.12 seconds per piece.
Gross production 155 pieces per hour.

Here's another example of the way a single Baird High Production Machine can be tooled to handle a series of operations ordinarily not considered practical on a single spindle automatic unit. Note that, in addition to the usual concentric operations being performed on this hub, we are drilling, countersinking, and tapping accurately located bolt holes in the hub flange at just two stations in the cycle and at a very satisfactory production rate for the whole operation. Photographs show the tooling and relative simplicity of the set-up.

And, as in the case of all Baird No. 76 Chucker installations, this one is conspicuous for smoothness and dependability of everyday performance. Automatic chucking frees operator's hands for efficient, easy feeding. Automatic safeguards prevent damage to work, machine, or injury to operator in case of incorrect loading. Spindle speeds are independently adjusted to best performance of the individual operation.

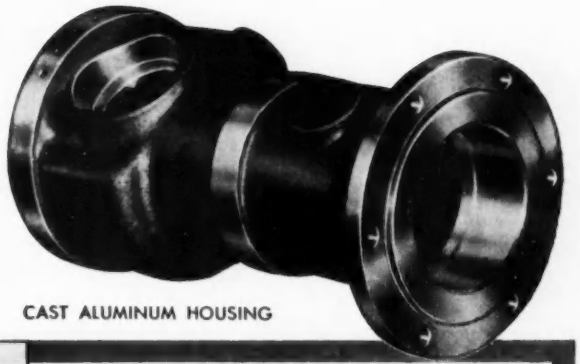
To step up speeds, quality of work, reduction in costs, check the Baird Chucker. "Ask Baird about it."

the BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

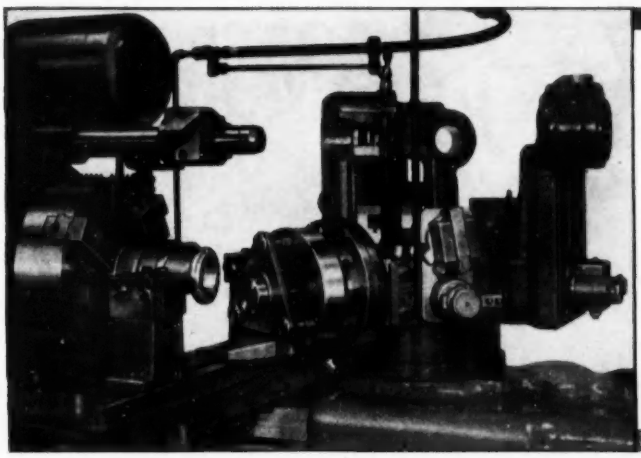
AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

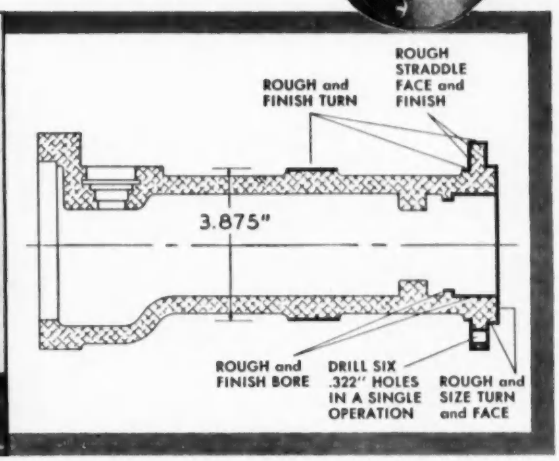
1BA53

Not Just a Hole in One—
but 6 IN ONE...
SIMULTANEOUSLY!



CAST ALUMINUM HOUSING



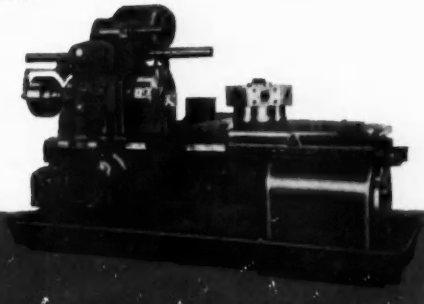


SURFACES MACHINED ARE INDICATED BY HEAVY LINES

On a 5-DE POWER-FLEX
Automatic Turret Lathe teamed with P&J TOOLING

An unusual job? No, not for that great production team, a P&J Automatic *plus* P&J Tooling, that has taken hundreds of other tough jobs like this in its stride . . . and done them faster, better and more profitably. The ingenious, time-saving set-up shown here makes use of a slide tool — operated by the cam on the overhead pilot bar — to machine the two 3.875" diameters which are smaller than the flange diameter nearest the turret. Notice too that all six holes in the flange are accurately located and drilled simultaneously in a single operation. This is made possible by using a special P&J Multiple Spindle Drill Head that is automatically indexed into position and locked.

If you'd like to produce your hard-to-machine jobs quicker and more accurately with fewer rejects and greater profits, let the P&J Team go to bat for you. **Send today for your copy of the 5D POWERFLEX Bulletin No. 131 . . . or ask P&J Tool Engineers to submit recommendations based on your own prints or sample parts.**



POTTER & JOHNSTON Co.
PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES – BEMENT – POND COMPANY

● INVOLUTE TEETH
and
● CAM SURFACE

BROACHED IN A SINGLE PASS

500 PIECES PER HOUR

Broaching .015 from the top surface of the cam and gear segment and cutting involute gear teeth 1/16" deep would ordinarily be a two-step operation.

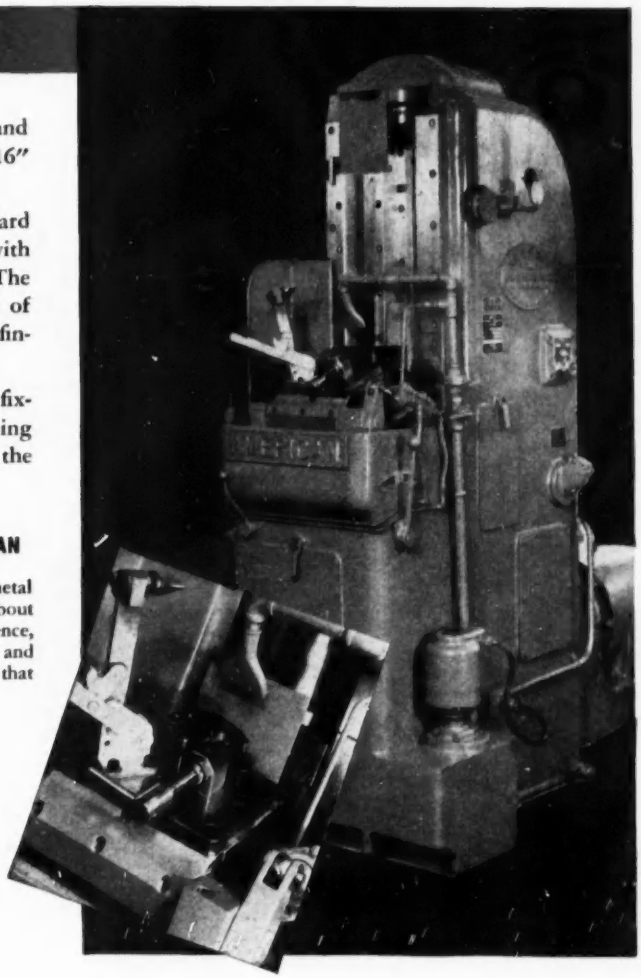
American engineered this job on a standard American T-8-24 3-way type machine equipped with a fixture unit built to hold four blanks at a time. The unit provided complete finishing from the blank of all surfaces in a single stroke, maintaining 500 finished parts per hour production.

The machine cycle is manually controlled. The fixture tilts up automatically at the end of the broaching stroke to permit unloading and reloading during the return stroke.

FOR ECONOMICAL PRODUCTION... CONSULT AMERICAN

If you're looking for low cost per part on a production metal removal operation, why not ask American engineers about broaching? You will get the advantages of their experience, gained through more than twenty-five years saving time and money on every type of broaching. You can be certain that recommendations by American are sound and basic.

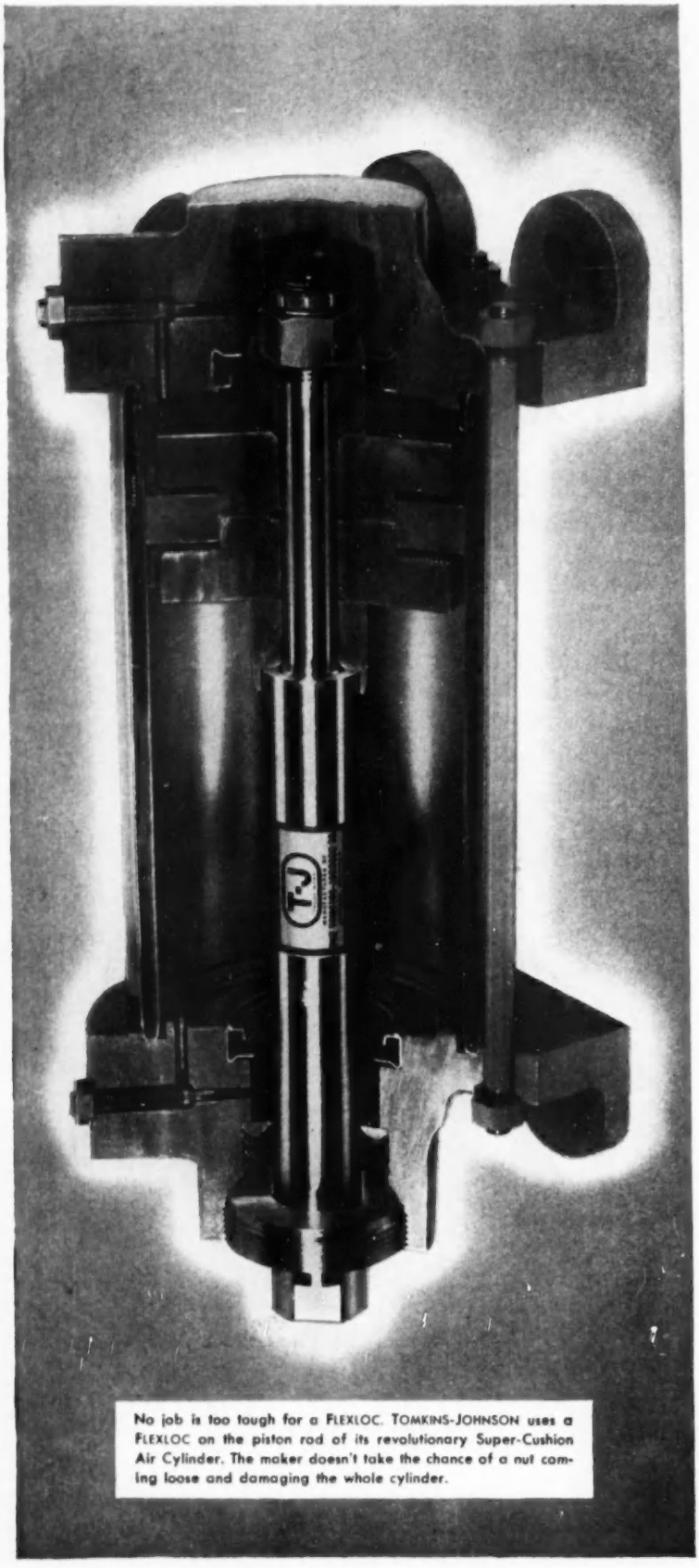
American's 3-way machine packs a versatile punch. Write for illustrated bulletin showing the jobs it can do. Ask for Circular No. 100. Address Dept. L



AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



No job is too tough for a FLEXLOC. TOMKINS-JOHNSON uses a FLEXLOC on the piston rod of its revolutionary Super-Cushion Air Cylinder. The maker doesn't take the chance of a nut coming loose and damaging the whole cylinder.

What FLEXLOC locknuts do for you

FLEXLOCs eliminate complicated, time-consuming methods of locking threaded fasteners. They offer simpler, faster application and safer, more dependable locking than plain nuts and lockwashers, castellated nuts and cotter pins, or nuts and jam nuts. And they won't work loose.

The reasons for all this are plain. FLEXLOCs are one piece—nothing to assemble, come apart, lose or forget. FLEXLOCs are all metal—have higher tensile than most other locknuts and are not affected by temperatures to 550°F. FLEXLOCs are both stop and locknuts—don't have to seat to lock, and stay put anywhere on a threaded member as soon as their locking threads are fully engaged.

SPS can deliver any quantity of FLEXLOCs in a wide range of sizes. Stocks are carried by industrial distributors everywhere. Write for literature. SPS, Jenkintown 53, Pa.

FLEXLOC

LOCKNUT DIVISION

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No matter what your handling problems may be, you can solve them with YALE Electric Trucks. Industries of every kind...companies of every size...are cutting handling costs as much as 75% with YALE equipment and methods... saving time, work and manpower, too. Get one of the wide range of standard models in the capacity you need to become your plant's most versatile tool...or get specialized trucks or attachments for your specialized handling jobs. One or both... a single truck or a fleet...you'll get more maintenance-free, 'round-the-clock service with safer YALE TRUCKS.

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Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-lifts

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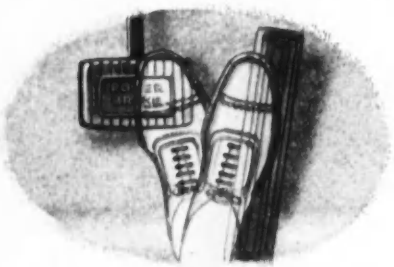
The Only Performance-Proven Low Pedal Power Brake

Car manufacturers, here is a sure answer to the problem of creating added interest in your line of cars. Equip your vehicles with Bendix* Low Pedal Power Brake, the sales feature that has already established itself as one of the most popular devices offered the public in years.

Dealers are enthusiastic because with the Bendix Low Pedal Power Brake it is now easy to demonstrate added braking power and safety. Service managers are happy because of its trouble-free performance and, best of all, new car buyers realize that with today's trend toward "power" operation, a car equipped with a Bendix Low Pedal Power Brake offers the ultimate in braking efficiency.

Remember, too, this new low pedal power brake is the product of Bendix, world's largest producer of power brakes and leader in braking developments since the earliest days of the industry. That's why if you are contemplating power braking it will pay to "Sign Up" with Bendix for the greatest improvement in braking since four wheel brakes. *REG. U.S. PAT. OFF.

NOW *Stopping* IS AS EASY AS *accelerating*



It is no longer necessary to lift the foot and exert leg power pressure to bring your car to a stop. With the Bendix Low Pedal Power Brake on about the same level as the accelerator, an easy ankle movement, much like working the accelerator, is all the physical effort required for braking. And by merely pivoting the foot on the heel, shifts from "go" to "stop" controls are made in far less time.

Result: MORE DRIVING COMFORT, LESS FATIGUE AND GREATER SAFETY.

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High Spots of This Issue

★ New Italian Cars Introduced at Turin Automobile Show

Several new models with interesting features were to be seen at the recent Turin Automobile Show, which attracted 400 exhibitors from 10 different countries. This on-the-spot report describes and illustrates the event in detail. See Page 48.

★ Latest Automatic Equipment at De Soto Engine Plant

Considered to be a model "push-button" operation from the time it was built, the De Soto engine plant has since incorporated added improvements, some of which have been reviewed before. This article covers the latest developments. Page 52.

★ Ford Past and Future Surveyed at 50-Year Mark

One June 16, Ford Motor Co. will mark the completion of a half century of achievement, during which it grew from an employer of only eight to a present total of 168,000 persons. The past now spurs the attainment of an even brighter future. Page 56.

★ Shell Molding's Opportunities for Foundry Advancement

Better castings for less money and the eventual achievement of closer tolerances are notable advantages which the shell molding process offers to the foundry industry. The author reviews the method's merits and its applications. Page 68.

★ Studebaker's Body Plant Redesigned for 1953 Cars

The marked changes in Studebaker styling this year required a radical overhauling of the company's body production facilities. Extensive conveyorization was one result of the renovation. Other improvements are also described. Page 70.

★ 35 New Product Items And Other High Spots, Such As:

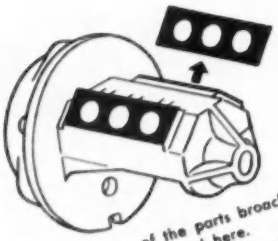
Number of vehicles in Sweden increasing at rapid rate; massive fixtures required for making C-123B transport; Soviet vehicles; special fixtures eliminate welding stresses in bus bodies; details of the Monroe power steering unit; and new industrial drives.

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3

Applying the Advantages of Hydro-Broaching

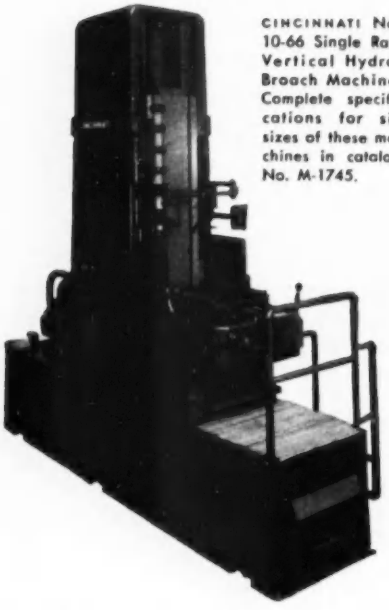
to a low production job

CINCINNATI



Drawing of one of the parts broached on the equipment illustrated here.

Part name ..... Cylinder for refrigeration unit
Material ..... Cast iron
Operation ..... Broach head surfaces
Stock removal .. 3/32"
Production ..... 15 per hour complete
Machine ..... CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach



CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach Machine. Complete specifications for six sizes of these machines in catalog No. M-1745.

Low rate of production does not necessarily rule out broaching. The equipment illustrated here broaches only 15 parts per hour, but at a lower cost than other methods of machining. ¶ A CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach Machine is equipped with a manually operated index fixture having interchangeable elements for four sizes of parts. One of them is illustrated in the drawing. Two surfaces of comparatively large area (7" x 3") are broached in two downward strokes of the cutting tools, the work being indexed for the second surface while the table has retracted during the return stroke of the ram. ¶ Many sizes and shapes of parts, usually groups having family characteristics, are being broached on CINCINNATIS at a big advantage in cost, accuracy and finish. Perhaps you can apply the broaching method of machining to your low production work. To help you analyze the problem, write for our publication No. M-1599-1 "How to Step Up Production With Cincinnati Hydro-Broach Machines."

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 108, No. 11 June 1, 1953

Is It Spring Fever?

A rash of labor stoppages has thrown something of a cloud over the optimistic forecast of the automobile industry for the first half.

For the past several weeks there have been sporadic uprisings in the ranks of labor for no apparent reason, even though both Ford and General Motors have agreed to modify their five-year contracts with the UAW-CIO. Four basic factors include an increase to five cents an hour from four cents in the annual improvement factor, adding 19 cents of current 24 cents an hour cost of living allowance to the base wage rates, an increase of ten cents for all skilled trade workers (20 cents for Ford die sinkers and pattern workers) and agreement on a conversion to the new BLS consumer price index. Retired Ford workers now have a maximum pension of $137.50 monthly.

Two key stoppages have been the Borg-Warner strike at the Warner Gear Div. and the Ford Canton, O., forge plant strike.

Nash, K-F, and Willys have been hard hit by the stoppage. Production of the Henry J and all Willys vehicles was suspended about the middle of May because of shortage of transmissions normally furnished by Warner Gear. K-F continued operations on the Kaiser line by installing a high percentage of Hydra-Matic transmissions but was finding its inventories getting out of balance.

Nash announced that it was cutting back production to 700 cars a day from 982 and plans to hold production at that level even when enough transmissions again are available until sometime in August.

All Ford assembly and most manufacturing plants outside Rouge were down by last week, laying off 85,000 workers. A spokesman said a week or more would be needed to build up stocks following last week's settlement at Canton.

Dodge, DeSoto, and Chrysler operations halted briefly when a wildcat strike at the Detroit Budd Co. plant cut off the supply of body stampings.

Strikes are affecting the industry in other parts of the world. After a strike of less than one hundred body trimmers, lasting three weeks, the whole of the nationalized French Renault organization was shut down, idling more than 40,000.

VERSATILE

The Ryan model 59 trainer, entrant in recent Air Force design competition, allows use of either single Allison 520-C1 or two Marbore 351's, depending on training requirements. Max. speed is 428-438 mph at 35,000 ft.

Sports Car Interest Noted by Chevrolet, Dow, Hudson

Chevrolet is intending to increase its production of the Corvette sports car considerably beyond original schedules. T. H. Keating, general manager, says that the Corvette will be built late this year at a rate of about 1000 units a month.

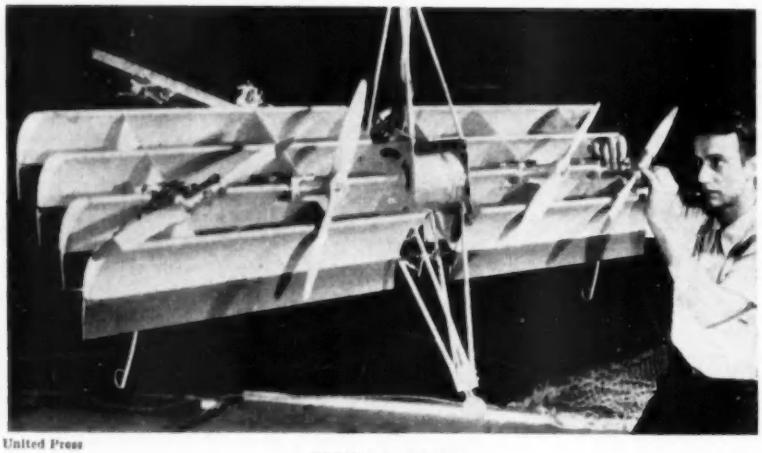
Dow Chemical Co. is experimenting with machinery for fabricating large plastic components which may lead to much more widespread use of plastic bodies in the automobile field. The company is working with a new vacuum press which heats plastic sheets and draws them down over forms to shape the piece. Hudson president A. E. Barit told stockholders a sports car is being built around the Jet chassis. He also said Jet output had not been reduced except for the Borg-Warner strike.

Ford II Indicates L-M Split

There are strong indications that Ford will split Lincoln and Mercury into two separate divisions. At a press conference in connection with Ford's 50th Anniversary Henry Ford II said he would not deny that report. He also indicated that William Clay Ford would head the new division. The latter has been made a Ford vice-president in charge of Special Products Operations engaged in special projects including designing a new Continental prestige car.

The company, before too long, may start to publish its financial earnings, according to Henry Ford II. There are no present plans, however, for public sale of Ford stock. Mr. Ford also said the company has no present plans for a smaller car or a sports car.

News of the AUTOMOTIVE



United Press

FLYING BLIND

This convertiplane model was shown to newsmen at Langley Field, Va., recently by the National Advisory Committee for Aeronautics. About the first such device to be revealed by the military in recent years, the venetian blind type of wing is being used to study control problems.

Detroit to be Air Host

"Fifty Years of Aviation Progress" is the theme of the Aero Club of Michigan's sixth annual International Aviation Exposition. It is scheduled for July 9-12 at the Detroit-Wayne Major Airport.

The first two days will be devoted to a trade show, including demonstrations of all type of aeronautical equipment. Military procurement agencies will maintain field offices where manufacturers may meet to discuss mutual problems. A grand entrance to the main outdoor display area and to the stands for the aerial activities will afford exhibits a half-mile of display booths.

The second two days will consist of military and commercial static and flight displays and demonstrations. Display areas cover over two million sq ft.

C. J. Reese, president of Continental Motors Corp., and president of the Aero Club of Michigan, is serving as general chairman.

Integral Ducts Planned for GM Air Conditioner

It is reported that General Motors will simplify installation of air conditioning units in its cars at the factory by designing ducts into the fender and body panels. It is understood that only cars slated for air conditioning will be equipped with the special ducts, indicating that the change will not be a full production design alteration.

Exhibit Aim is Service

The General Motors Parade of Progress which opened in Dayton, O., May 12 represents large industry's implied acceptance of its role as a quasi-public institution. The exhibition is strictly noncommercial with about the only GM "selling" contributed by the company's trademark on vehicles and equipment used in the caravan. Actually, the show is devoted to the advancement of understanding in the fields of engineering and science with the subtle objective of interesting the nation's youth in scientific and engineering careers.

The corporation recognizes that technical, social, and economic progress during the coming years will require large numbers of trained scientists and engineers, and naturally hopes that at least some of the recruits to these professions who are sparked by the GM show eventually will find their way into the company's laboratories. The show contains basic exhibits in the fields of aviation, automobiles, chemistry, and electronics which are presented through demonstrations and lectures, all at levels which make them easily understood by the general public.

Dow Corning Celebrates its Tenth Anniversary with Broad Expansion of Silicone Facilities

In conjunction with the celebration of its Tenth Anniversary, Dow Corning Corp. recently invited a group of newspaper and trade magazine editors to Midland, Mich., to tour its plant facilities and examine at first-hand its broad range of silicone products for all types of industrial applications.

The firm was formed a decade ago by Dow Chemical Co. and Corning Glass Works with a legacy of nine years of basic research in the field of silicone chemistry and 40 years of chemical processing knowledge from its parent Dow. An initial investment of $1.6 million grew to such an extent that gross sales increased from $15,000 during its first full month of business to $1.5 million a month 10 years later. The company is now investing about $16 million in a current expansion program that will soon quadruple its capacity for making silicone products.

New Plants

Typical of the company's physical progress is its new methyl chloride plant with a potential capacity of a million lb a month and a recently completed Silastic plant that is said to be the largest in the world for the production of silicone rubber. Another interesting facility is a 6000 kva electric furnace plant for producing silicon from quartz rock and coke.

Unique in the U. S. is a new plant built for Dow Corning in Germany for making silica "soot." Other centers of attraction are the Grignard and direct process plants, pilot and

(*Turn to page* 118, *please*)

AND AVIATION INDUSTRIES

Canadian Capacity Gets Two Boosts

Southern Ontario's Diamond Horseshoe of industry, from Oshawa to Niagara, gained added luster with disclosure by W. A. Wecker, General Motors of Canada president, of plans for construction of the largest automobile assembly plant in Canada and probably in the British Commonwealth.

Ground will be broken at once, two years ahead of schedule, for a 42-acre plant at Oshawa, nearly one-third larger than the Ford-Oakville assembly plant which has just gone into production. The new GM plant will bring total factory area to 115 acres at the site. Cost is estimated at over $40 million.

Partial production will begin this fall, with transfer of all Buick, Pontiac and Oldsmobile operations to the new plant. By the fall of 1954, transfer of Chevrolet production will be completed. Truck production will continue in existing plants.

On May 11, just one year and five days after turning the first sod, the 32½ acre new Ford Motor Co. of Canada assembly plant at Oakville, turned out its first cars. The new $35 million plant will turn out Ford and Meteor cars, and in 1954 will also handle higher priced Mercury and Monarch cars along with Ford trucks. It is expected that by late summer 1953 at least 300 cars per day will be turned out at the new plant, presently the largest under one roof in Canada or anywhere outside the United States. Present employment of 400 should reach 2500 by late summer and 4000 at its peak next year.

WRECKER

Salvaged Sherman tanks are the basis of this tank wrecker. Bowen - McLaughlin - York will rebuild 1000 at saving of $110,000 each. Rebuilt 500 hp Ford engine is used, together with wider 23-in track. Unit weighs under 50 tons.

Chrysler Quarterly Net $24 Million

Chrysler Corp. had the highest sales in its history for the first three months of this year and net earnings reached more than $24.4 million. Net return on sales, however, was lower than last year, amounting to 2.64 per cent compared with 3.24 per cent for the same quarter a year ago. Defense work accounted for about 21 per cent of total sales. The company also announced that it had made a loan of $8 million to Pennsylvania Steel Co. for expansion and to insure Chrysler a better supply of steel.

Ford to Build Another N. J. Assembly Plant

Plans to build another large passenger car and truck assembly plant near Mahwah, N. J., have been confirmed by Ford Motor Co. The new plant is the third to be announced since the middle of February and will be completed within the next two or three years. It will be the largest Ford Div. assembly plant and will manufacture passenger cars and trucks on separate assembly systems. Plans for eventual disposition of the present Edgewater plant have not been determined. The new plant will have more than 1½ million sq ft of manufacturing space for two-shift operation, and will have triple the capacity of the Edgewater plant. Peak employment could reach 5000.

SHOPPER'S SPECIAL

Parking is no problem for the driver of the German Kleinschnittger small sport car. In this situation she can lift the rear end of the 300-lb midget into the curb by hand.

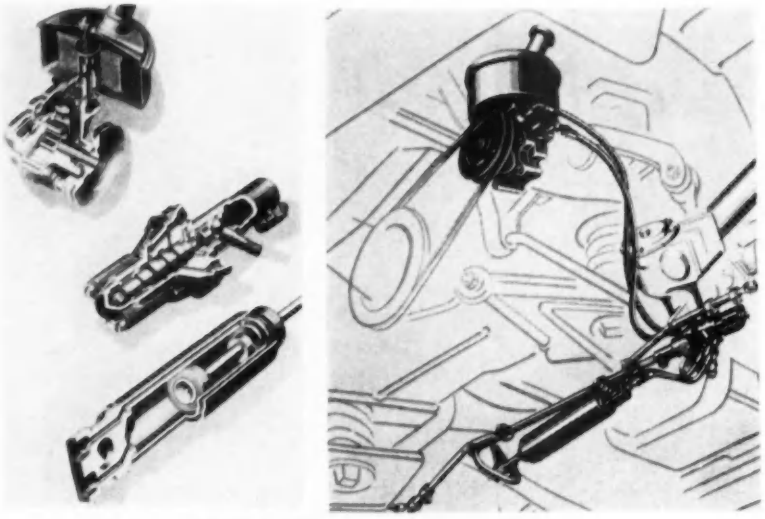
United Press

Polar Flying, A-Bomb Feature SAE Meeting

Possibilities of trans-Polar flights will feature the 1953 Summer Meeting of the Society of Automotive Engineers June 7 through 12 at Atlantic City, N. J.

Engineers will consider also the technical requirements of riding comfort, probable A-bomb damage to motor vehicles, application of automatic transmissions to motor trucks, and problems of preignition. Reports on cold-weather starting and lubricating requirements in Arctic operation will be presented by chairmen of Coordinating Research Council groups.

News of the AUTOMOTIVE



TO BOOST MERCURY STEERING

Here is a cutaway of the pump, valve, and cylinder of the Bendix power steering unit now used by Mercury. The linkage booster unit uses a separate power cylinder, which also serves as a wheel fight damper. Steering wheel rim force required ranges from 3½ lb for turns at cruising speeds to 8½ lb in parking.

Gasoline Additive Boosts Engine Power, Mileage

A new gasoline additive described as the "biggest development in motor fuel since the introduction of tetra ethyl lead 31 years ago" will be added to Shell Oil Co's. premium gasoline, F. S. Clulow, manufacturing vice-president, announced last month.

Shell claims it gives the average car up to 15 per cent more power, more mileage, and from 50 to 150 per cent longer life for spark plugs. Gasoline containing the new product also cleans old plugs and cuts down pre-ignition. The new additive is TCP, a cresyl compound named tricresyl phosphate, supplied by Monsanto Chemical Co.

The firm will extend the distribution nation wide as soon as necessary facilities can be installed, in about two months. Special pumps and other blending equipment are needed in combining TCP with gasoline. Price will be a half cent above that of other premium gasolines.

The new product is the result of research Shell began for the Air Force over five years ago. It has been used in Navy fighters and Air Force B-36 bombers for the past two years. Tests in automobiles showed that on the second tankful gasoline containing TCP would produce the full effects of increased power and mileage and insure reliability of plug performance.

Promotes British Plugs

Mr. Frank Hurn, director of Smiths of England, leading manufacturer of automobile and aviation instruments and equipment, including K.L.G. spark plugs, arrived in the United States last month for a series of conferences that will take him around the country.

Power Steering Price Cut by K-F, Mercury

Price of power steering is coming down fast. Mercury and Kaiser-Frazer have announced power steering units at prices substantially lower than have been prevailing for previous units. K-F has the lowest-priced package at $130.80 including federal excise tax as standard on the Dragon and optional on Manhattan. The Mercury power assist lists as an option at $150.50, also including federal tax. Both units are of the linkage booster type but are supplied by different manufacturers. The Mercury unit is made by Bendix, whereas Monroe Auto Equipment is supplying K-F.

Oil Changes Stand Eased

The American Petroleum Institute has qualified its previous recommendation of crankcase oil changes every 1000 miles, thereby falling in line with recommendations of the automobile manufacturers. Question of the 1000 mile oil change long has been a point of disagreement between the oil and automotive industries. API now has taken a position that under open highway driving conditions the interval between changes may be extended up to 2000 miles. On city and suburban driving, however, it is sticking with its old recommendation of 1000 miles and in dusty or cold weather driving the interval recommended is 60 days or 500 miles of travel.

EASY EXIT

The Iso, an Italian two-seater, features a hinged steering column and a front-end door. The 12 cu in. engine develops 9.5 hp, will drive the car up to 55 mph through four gears.

United Press

AND AVIATION INDUSTRIES

Million from California

Chrysler Corp. on June 17 will celebrate production of the millionth car produced by the corporation in California. Chrysler first started building vehicles there more than 25 years ago with production gradually increasing until it currently exceeds 100,000 units a year at the Los Angeles and San Leandro plants.

Two New Services

Lacy Mfg. Co. and Kittell Muffler and Engineering, Inc., recently announced the formation of Kittell-Lacy, Inc., a jointly-owned subsidiary, to design, build and install complete jet engine sound abatement facilities.

Gladden Products Corp., Glendale, Calif., manufacturers of aircraft products, gasoline engines, and Mustang motorcycles, recently issued a statement to the trade, stating that they are opening a service to all aircraft manufacturers on solution of air-handling problems.

Rubber for Roads

Use of rubber as a roadbuilding material apparently is gaining acceptance. Goodyear Tire and Rubber Co. has joined with National Lead Co. and Berry Asphalt Co. to form a new firm to be known as Rubarite, Inc., to produce and sell synthetic rubber powders for use in asphalt for road paving. The three companies developed the product, a free flowing unvulcanized synthetic rubber which is mixed with asphalt. A new plant is being built in Arkansas to produce the product.

NEW MACK

The B series Mack trucks were introduced recently, featuring new weight-reducing construction and accessibility for service. Four and six wheel types are offered from 17 to 70,000 lb GVW, either gasoline or Diesel powered.

New Industrial Engines Announced by Four Makers

The latest in a new series of engines for truck and industrial services to be placed in production by the Hall-Scott Motor Div. of ACF-Brill Motors Co. is their Model 855. The new model is a six-cyl engine which can be built to operate on gasoline of various octane ratings or on LPG fuels.

Unit construction of the engine permits replacement of cylinder block and pistons. The cylinders, which are cast enbloc, are of chrome nickel molybdenum iron and the hold down studs extend from crankcase up through the block and cylinder head.

The engine has a displacement of 855 cu in., and bare dry weight of 2150 lb. Operating on 76 octane gasoline, the engine will develop a rated gross horsepower of 265 with a net rating of 240 at 2400 rpm, and a maximum torque of 680 lb ft at 1400 rpm. Using LPG it develops 295 rated gross horsepower and 276 net at 2400 rpm, with maximum torque at 775 lb ft at 1200 rpm. A "figure eight" combustion chamber and swirl-type intake ports have been developed. Compression ratios have been increased on the gasoline engines to 6 to 1 while LPG engines are using 9 to 1 ratio.

New Reo Series

The Industrial and Marine Engine Div. of Reo Motors, Inc., which was activated early in the year, has completed design work on a series of spark ignition industrial engine models for use with gasoline, natural gas, LPG or dual fuel carburetion.

The new engines were formally introduced at the International Petroleum Exposition last month. The line includes six-cyl, four cycle ohv engines of 292 and 331-cu in. displacements, and twin six-cyl units of the larger size. Output of the basic en-

(*Turn to page* 120, *please*)

1953 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1953 Three Months' Totals

MAKE	March 1953	February 1953	March 1952	THREE MONTHS Units 1953	Units 1952	Per Cent of Total 1953	Per Cent of Total 1952
Chevrolet	30,490	24,817	20,530	80,481	59,521	36.43	32.65
Ford	15,728	15,936	15,035	49,992	41,226	22.63	22.61
International	9,762	7,685	7,400	25,184	20,930	11.40	11.48
Dodge	8,546	7,536	7,276	23,737	22,561	10.75	12.38
G. M. C.	7,711	6,498	6,224	21,277	18,164	9.63	9.96
Studebaker	2,413	2,106	2,246	6,728	6,497	3.05	3.56
White	1,216	835	975	2,830	2,747	1.28	1.51
Willys Truck	911	756	841	2,705	2,533	1.22	1.39
Willys Jeep	742	845	629	2,413	1,804	1.09	.99
Mack	661	590	532	1,841	1,596	.70	.88
Reo	346	263	272	892	747	.40	.41
Diamond T	292	227	345	766	925	.35	.51
Divco	197	171	309	517	796	.23	.44
Brockway	189	168	144	511	398	.23	.22
Autocar	162	126	120	363	409	.17	.22
Federal	89	76	78	272	187	.12	.10
Kenworth	65	50	82	167	179	.08	.10
Pontiac	38	31	52	111	173	.05	.09
F. W. D.	27	37	44	102	154	.05	.08
Peterbilt	10	4	10	35	55	.02	.03
Misc. Domestic	84	44	218	168	652	.08	.36
Misc. Foreign	34	16	22	82	56	.04	.03
Total—All Makes	79,672	68,616	63,364	220,894	182,310	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE

LIGHT BUS

This 16-passenger airport bus was designed to fill the gap between 30-passenger units and limousines. Boyertown Auto Body Works adapted its standard delivery body to keep costs down. The steel unit has fluted aluminum side panels, sponge rubber seats and tinted overhead skylights.

Press Plant Set

It took the Aluminum Co. of America and the Air Force five months to win an argument with the councilmen of Cuyahoga Heights, a Cleveland suburb. Alcoa and the government wanted to build a $40 million press plant for jet parts there. Councilmen and other officials had refused a building permit, because the government-owned plant would be tax-free. Recently councilmen gave in, hoping a new Senate bill supplying compensation would be passed, and approved a permit. Construction will start after the Air Force approves a low bid on the plant. Forging presses of 35,000 to 50,000 tons capacity will be housed in the plant.

Ford Fund Gives Million for Atomic Research

Ford Motor Co. Fund has awarded a $1 million grant to the University of Michigan for construction of a nuclear research reactor. The grant will be available for construction of a reactor and building and for any basic and essential equipment which is an integral part of the reactor. The award represents the Fund's first substantial contribution to atomic research.

New Chrysler Snubber Adopted on T-48 Tank

Army Ordnance has adopted a new Chrysler designed shock absorber for the Patton 48 tank. The snubber is an adaptation of the railroad freight car truck unit designed by Chrysler. In appearance it resembles the tubular shock absorber but gets its snubbing action from friction of a brake lining type material which rides against the inside surfaces of the steel tubing. According to Chrysler, the friction type snubber eliminates the complication of hydraulic shock absorbers with their varying rates of snubbing action.

White Building Program

White Motor Co. has plans for three building projects that will cost over $1.8 million. The biggest, which is subject to directors' approval, is a $1 million unit adjoining its coach and aircraft division on E. 185th St. in Cleveland. To increase its service and sales facilities, another $500,000 will go to triple its space on E. 49th St. in Cleveland. The company also will spend about $350,000 in Regina, Saskatchewan, Canada, for a branch service and sales building.

T-D Expands Ohio Plant

Timken-Detroit Axle Co. will expand its Kenton, Ohio, plant by approximately 40 per cent. Construction already has started on the project. The Kenton plant produces truck-trailer axles.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	March 1953	February 1953	March 1952	Three Months 1953	Three Months 1952	Per Cent Change: Mar. over February	Per Cent Change: Mar. over Mar. 1952	Per Cent Change: Three Months 1953 over 1952
1	New England	28,564	20,501	18,687	69,415	50,555	+39.33	+51.24	+37.31
2	Middle Atlantic	94,066	79,993	60,771	234,924	163,871	+17.59	+54.79	+43.36
3	South Atlantic	57,334	43,933	38,208	140,972	116,496	+30.50	+50.06	+28.74
4	East North Central	131,306	99,076	87,115	332,093	240,336	+32.53	+50.73	+38.18
5	East South Central	22,988	20,233	16,044	62,453	44,548	+13.62	+43.28	+40.19
6	West North Central	43,564	36,806	31,093	112,539	92,212	+18.36	+40.11	+22.04
7	West South Central	41,084	39,319	26,358	124,561	86,352	+ 4.49	+55.87	+44.25
8	Mountain	16,287	12,526	10,461	41,895	27,476	+30.03	+55.69	+42.13
9	Pacific	51,173	44,171	33,920	141,295	95,869	+15.85	+50.86	+47.38
	Total—United States	486,368	396,558	322,857	1,269,147	919,715	+22.65	+50.65	+37.99

States comprising the various regions are:—Zone 1: Conn., Me., Mass., N. H., R. I., Vt.—Zone 2: N. J., N. Y., Pa.—Zone 3: Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4: Ill., Ind., Mich., Ohio, Wis.—Zone 5: Ala., Ky., Miss., Tenn.—Zone 6: Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7: Ark., La., Okla., Tex.—Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9: Cal., Ore., Wash.

AND AVIATION INDUSTRIES

Ford Adds Another Ship to Ore Fleet

Ford will put into service in August its newest ore carrier, the William Clay Ford, which was launched May 5. The new vessel is the largest of the three in the company's fleet with an overall length of 647 ft, a beam of 70 ft and a depth of 36 ft. It will have a carrying capacity of 19,000 gross tons and its 7000-hp oil-fired steam turbine will give it a speed of 16 mph.

Profit in Israel Tires

The first year's operation of the Alliance Tire & Rubber Co., Ltd., pioneer American-Israeli enterprise, has not only measured up to original production estimates but exceeded even the most optimistic forecasts. Alliance, privately financed, is now functioning on a profitable basis. Dayton Rubber Co. is serving under a ten-year contract as technical advisor to Alliance.

The American equipped Alliance plant located on a 25-acre site at Hadera began complete start-to-finish tire and tube production last September. Bus and truck tires are taking about 85 per cent of Alliance production; passenger tires the remainder.

Helicopter Problems Aired

Great interest was shown by industry and the Government in the present and future problems of helicopter manufacturers at the ninth annual forum of the American Helicopter Society. A four-day program in Washington, D. C., last month drew a record attendance of over 400, representing the entire industry, the suppliers, colleges, Government laboratories, and the armed services. Seventeen technical papers covered a range from the philosophy of vertical-flight problems to characteristics of several helicopters and flight training experience of the services.

At the cost reduction symposium industry leaders again called for greater use of off-the-shelf components, and indicated that project engineers could design more cost reducing features into the product without making large consessions to the aerodynamicists.

Trolley Coach Session

The trolley coach will be discussed during a Land Transportation Symposium scheduled for Wednesday, June 17, during the five-day session of the summer general meeting of the American Institute of Electrical Engineers at the Chalfont-Haddon Hotel, Atlantic City, N. J.

The subject will be considered in papers on service performance and competitive operating costs.

1953 RETAIL CAR SALES BY PRICE GROUPS*

NUMBER OF CARS

	March				Three Months			
	1953		1952		1953		1952	
Price Group	Units†	% of Total	Units†	% of Total	Units†	% of Total	Units†	% of Total
Under $2,000	259,182	53.61	174,892	54.51	676,418	53.65	493,846	54.04
$2,001 to $2,500	136,059	28.14	92,124	28.72	352,486	27.96	296,815	32.48
$2,500 to $3,500	68,697	14.21	39,128	12.20	177,568	14.08	90,260	9.88
Over $3,500	19,522	4.04	14,654	4.57	54,300	4.31	32,863	3.60
Total	483,460	100.00	320,798	100.00	1,260,772	100.00	913,784	100.00

DOLLAR VOLUME OF SALES

	March				Three Months			
	1953		1952		1953		1952	
Price Group	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total
Under $2,000	$465,869,534	45.00	$311,041,318	46.00	$1,217,061,648	45.02	$867,874,911	45.76
$2,001 to $2,500	306,115,838	29.58	205,186,447	30.35	790,902,584	29.26	659,049,195	34.75
$2,500 to $3,500	189,586,439	18.32	105,960,974	15.67	487,277,575	18.02	248,895,886	13.12
Over $3,500	73,446,475	7.10	53,988,886	7.98	208,181,311	7.70	120,900,955	6.37
Total	$1,035,020,286	100.00	$676,177,625	100.00	$2,703,423,218	100.00	$1,896,720,947	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

1953 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1953 Three Months' Totals

				THREE MONTHS			
				Units		Per Cent of Total	
MAKE	March 1953	February 1953	March 1952	1953	1952	1953	1952
Chevrolet	116,796	89,831	65,557	276,550	198,356	21.78	21.68
Ford	81,076	69,922	63,011	227,615	142,854	17.93	15.53
Plymouth	47,768	41,235	31,494	136,005	105,713	10.72	11.49
Buick	41,422	34,680	24,212	102,204	71,531	8.05	7.78
Pontiac	33,210	26,103	18,608	86,158	58,655	6.79	6.38
Oldsmobile	28,751	23,722	17,743	71,271	50,140	5.62	5.45
Dodge	25,717	20,638	17,631	67,959	51,234	5.35	5.57
Mercury	21,557	17,745	14,000	59,133	38,259	4.66	4.16
Nash	16,005	12,588	9,201	41,356	27,856	3.26	3.03
Chrysler	13,600	11,076	9,026	36,378	27,727	2.87	3.01
Studebaker	11,822	7,514	13,410	31,040	43,979	2.45	4.78
De Soto	10,062	8,344	7,784	27,762	20,908	2.19	2.27
Cadillac	9,940	8,583	6,916	26,641	17,753	2.10	1.93
Packard	7,943	6,654	5,607	21,047	14,439	1.66	1.57
Hudson	6,160	4,700	6,074	16,176	17,018	1.27	1.85
Willys	5,075	4,483	2,807	13,974	6,545	1.10	.71
Lincoln	2,510	2,507	2,049	7,946	4,205	.63	.46
Kaiser	2,659	2,211	3,059	7,491	8,561	.59	.93
Henry J	1,280	1,144	2,342	3,726	6,647	.29	.72
MG (British)	682	613	410	1,878	1,175	.15	.13
Ford (British)	400	401	273	1,268	852	.10	.09
Hillman (British)	408	434	353	1,205	877	.09	.10
Jaguar (British)	386	284	208	1,034	568	.08	.06
Austin (British)	362	326	374	1,030	1,168	.08	.13
Allstate	71	72	86	209	282	.02	.03
Misc. Domestic	179	199	491	463	1,472	.04	.16
Misc. Foreign	537	549	331	1,626	943	.13	.10
Total—All Makes	486,368	398,550	322,857	1,269,147	919,715	100.00	100.00

* Based on data from R. L. Polk & Co.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Diamond T Motor Car Co.—Z. C. R. Hansen joins the factory sales organization as a vice-president.

Gemmer Mfg. Co.—Frank E. Phillips was raised to senior vice-president. W. A. Blume thus becomes vice-president of sales.

Illinois Tool Works—Jay Tomlin was promoted to director of public relations.

Boeing Airplane Co.—George C. Martin is now chief engineer of the Seattle Div. M. L. Pennell succeeds him as chief project engineer—aircraft, and R. L. Pouzie becomes senior project engineer—jet transport program.

Jack & Heintz, Inc.—Appointment of S. Floyd Stewart to the post of assistant to the president has been announced.

Aro Equipment Corp.—Arthur S. Iberall now directs the newly formed research and development department of the Aircraft Div.

Sundstrand Machine Tool Co.—**Louis H. Schuette,** vice-president in charge of the hydraulic division, was elected a director recently.

Fisher Body Div.—Appointment of **Frank H. Burns** as assistant director of the material handling and control section has been announced. At the Los Angeles, Calif., plant, Charles E. Pigg, Jr., was named director of industrial relations.

Ford Motor Co.—**Earle S. MacPherson,** vice-president—manufacturing, has been elected vice-president of the Coordinating Research Council, Inc., the organization which promotes cooperation between the automotive and petroleum industries.

Chrysler Corp.—Presidents of five divisions were elected company vice-presidents recently. They were **Robert T Keller,** Marine and Industrial Engine Div.; **John P. Mansfield,** Plymouth Div.; **W. C. Newberg.** Dodge Div.; **E. C. Quinn,** Chrysler Div.; and **L. Irving Woolson,** De Soto Div. **Frank W. Misch** was elected comptroller, assuming certain responsibilities of **B. E. Hutchinson,** whose administrative duties were assumed by the new vice-president. Hutchinson remains as chairman of the finance committee.

Champion Spark Plug Co.—**Clyde V. Sweet** has been appointed traffic manager.

Fargo Div., Chrysler Corp.—**N. W. Seidel** was elevated to vice-president in charge of sales.

Hydro-Aire, Inc.—**J. H. Overholser,** executive vice-president, has resigned.

Breeze Corp.—**Michael J. McCormack** has joined the firm as a vice-president and general sales manager.

Fruehauf Trailer Co.—Retirement of **Harvey C. Fruehauf,** board chairman, because of health has been announced.

New York Air Brake Co.—**Karl W. Galliger** fills the new post of manager of aircraft engineering and sales in the Aircraft Div.

J. W. Mortell Co.—The following appointments were made recently: **T. P. Fitzpatrick,** vice-president and general manager; **E. F. Gerrity,** sales manager; **R. A. Dixon,** assistant treasurer.

B-O-P Assembly Div., General Motors Corp.—**Robert D. Sheehan** has been promoted to director of material control and purchasing.

Lockheed Aircraft Corp.—**Lewis Carter Burwell, Jr.,** has been named director of development planning.

Kaiser-Frazer Corp.—**A. G. Lohr** was promoted to general manager of the parts and accessories division, following the death of **A. K. Steigerwalt.**

Solar Aircraft Co.—**Fred S. Hage, Jr.,** is now chief contract administrator at the Des Moines, Ia., plant.

H. M. Harper Co.—**Tom Stott** recently became a vice-president.

Bohn Aluminum & Brass Corp.—**Dr. G. V. Kingsley** has been promoted to research supervisor, and **Edward O. Falberg** is now production metallurgy supervisor.

Piasecki Helicopter Corp.—**Herman C. Taylor** fills the new position of assistant chief engineer.

Simmons Machine Tool Corp.—Founder **Charles A. Simmons, Sr.,** has been elevated to chairman. **Charles A. Simmons, Jr.,** succeeds him as president.

Mechanical Air Controls, Inc.—**Jack L. Modrich** has joined the firm as general sales manager.

Perfect Circle Corp.—Dewey Bookout, above left, fills the new position of chief industrial engineer. Dean Parsons, right, heads the new machining division and Richard Bancroft, below left, heads the new castings division. Karl Effmann, right, becomes manager of the engineering division.

Monarch Machine Tool Co.—**Paul H. Lahr** is now European service representative engineer.

Buick Motor Div.—**John H. Scudder** recently became director of merchandising.

International Nickel Co.—**L. E. Grubb** has been promoted to general superintendent of the Huntington, W. Va., works. He is succeeded as general superintendent of the Bayonne, N. J., works by **P. H. Flynn.**

Link Aviation, Inc.—Three new managers are: **Robert P. Hall,** production engineering; **Floyd H. Lawson,** inventory control, and **Albert T. Threthaway,** production control. **Byron S. Brokaw** was named executive assistant to the president.

Bardwell & McAllister, Inc.—**Paul Winkler** has been elected vice-president and director of sales.

North American Aviation, Inc.—**John W. Young** is now director of quality control. **Fred L. Boeke** is chief power plant engineer.

Timken-Detroit Axle Co.—**A. E. Wilson** has joined the firm as a sales engineer.

National Automotive Fibres, Inc.—**John G. Bannister,** vice-president in charge of sales, was appointed a director recently.

De Soto Div.—William B. Shimer is now master mechanic, succeeding John H. Meyn, who resigned. James L. Wichert is now director of advertising and sales promotion, succeeding the late Karl H. Bronson.

Schultz Die Casting Co.—**James Gerity, Jr.,** has been returned to the board. He is the firm's secretary and is also president of Gerity-Michigan Corp.

Wolverine Tube Div.—**A. S. Kromer** has been named manager of the Decatur, Ala., plant. **Russell M. Frink** is promoted to director of operations for the division. **Vincent A. Zatell** replaces Frink as Detroit plant manager.

Jack & Heintz, Inc.—**J. E. Mulheim** recently was named chief engineer.

General Dynamics Corp.—**Frank Pace, Jr.,** former Secretary of the Army, was elected executive vice-president, and vice-chairman of Canadair, Ltd. **Vernon H. Welch** has joined the firm as vice-president—communications, and assistant chairman of the firm.

Lear, Inc.—**Roy J. Benecchi** has been appointed assistant secretary.

Pacific Airmotive Corp.—**William T. Maxfield** recently became assistant to the vice-president-aircraft and engines. **Galen Potter** is now manager of the Burbank Aircraft Div. **Robert C. Brahm** was advanced to assistant manager of the Chino plant.

Marbon Corp.—Election of **D. M. Pratt** as vice-president and sales manager was announced recently.

Parker Appliance Co.—**Kilbourne Knox, Jr.,** formerly with McDonnell Aircraft, has joined Parker as staff engineer in charge of engineering on hydraulic equipment.

A. M. Sargent, Inc.—**A. M. Sargent,** formerly with Pioneer Engineering and Manufacturing Co., has opened his own consulting engineering office.

Timken Roller Bearing Co.—H. E. Markley was elected secretary and G. L. Deal treasurer, following the retirement of J. A. Riley on May 31.

Lockheed Aircraft Corp.—**William R. Wilson** is now public relations manager of the California Div. and **Donald M. Wilder** is industrial relations director of the division. **H. W. Bissell** was promoted to personnel manager and **Merrill J. Cate** to labor relations manager.

North American Aviation, Inc.—**Dr. Mark Mills** has been appointed to the Air Force Scientific Advisory Board on the panel for fuels and propulsion.

Temco Aircraft Corp.—**Gene B. Spaulding** recently was named superintendent of electronics. **Walton M. Dallas** is now manager of manufacturing control.

Simonds Abrasive Co.—**E. F. Mitchell** is now Detroit district manager.

Bonney Forge & Tool Works—**Thomas G. Judd** has been named director of advertising and merchandising.

Solar Aircraft Co.—**Robert S. Putnam** has joined the firm as industrial relations division manager.

Bardwell & McAlister, Inc.—**Glenn E. Odekirk,** formerly with Howard Hughes, has been elected a director.

Necrology

Clyde B. Dakin, 62, manager of the Oldsmobile forge plant, died at Lansing, Mich., on May 4.

Walter P. Zager, 65, founder and president of Zager Tool, Inc., died April 23 at Cleveland, O.

"...and that is our Gear Department"

WE DOUBT that the photo of our plant hangs on many of our customers' walls. But we *do* serve as the "gear department" for many companies with both small and large gear requirements.

The benefits these customers enjoy might interest you. Working closely with you, all our facilities and personnel are at your service—trouble-shooting, designing, specifying, engineering, and manufacturing gears to meet your needs exactly. And behind these functions is the experience we have gained through almost forty years devoted exclusively to gear manufacture.

Of course, we sell to many manufacturers who make a portion of their own gear requirements, and shall always continue to do so. But for many companies, and perhaps yours is one, much may be gained by examining case histories of customers who refer to our company as their "gear department."

* * *

Write for our comprehensive catalog containing full information on the ten gear types in which we specialize.

AUTOMOTIVE GEAR WORKS, INC.

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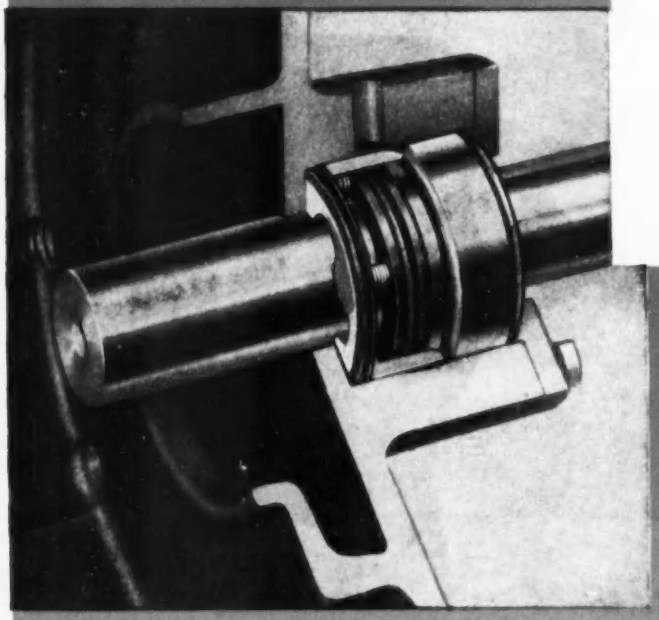
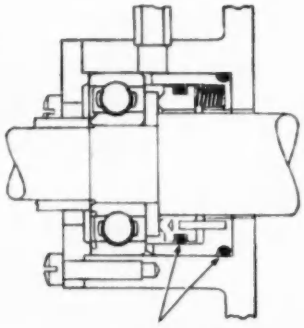
DOUBLE DIAMOND GEARS

FOR FARM EQUIPMENT, AUTOMOTIVE & GENERAL INDUSTRIAL APPLICATIONS

A PAIR OF PRECISION "O" RINGS

makes possible this oil seal's simple design and maintenance-free performance!





"O" RINGS

Two *Precision* "O" Rings are used in the Janette Oil Seal. This simple design is easy to assemble, requires no maintenance, and protects the vital parts of the seal from dust. The performance record of the Janette Seal is unsurpassed. Years of experimentation, lab and field tests went into its development. *Precision* "O" Rings met the tests and got the job!

Everyone is finding *Precision* "O" Rings the best answer to many sealing problems—and they are finding, too, that *Precision* leads the field in engineering help and proper deliveries to keep production lines going. Let us work with you. Send for our "O" Ring Handbook and let us have your inquiries.

FREE—Write for your personal copy of our Handbook on "O" Rings.

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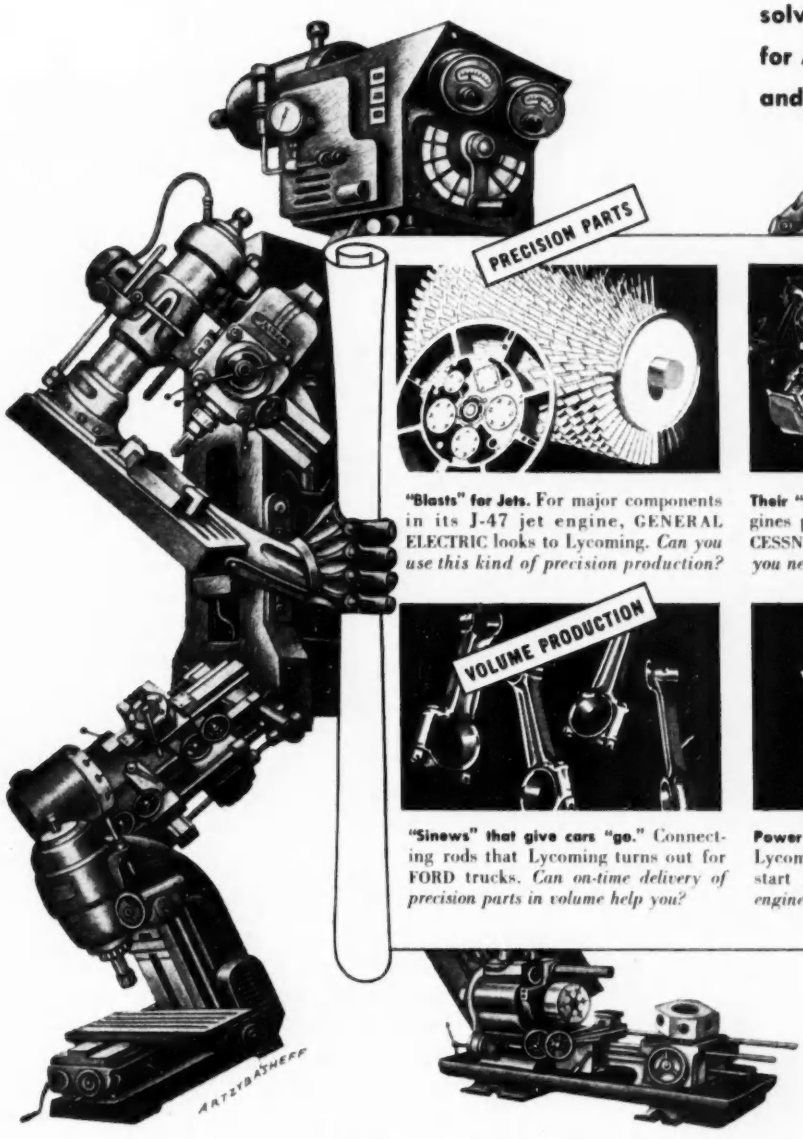
Big "doings" in metal

Here are just four outstanding achievements of Lycoming's precision production . . . samples that indicate how Lycoming solves metal-working problems for America's industrial leaders and the Armed Forces.



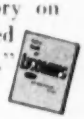
"Blasts" for Jets. For major components in its J-47 jet engine, GENERAL ELECTRIC looks to Lycoming. *Can you use this kind of precision production?*

Their "song" fills the air. Lycoming engines power aircraft made by BEECH, CESSNA, PIPER, AERO-COMMANDER. *Do you need this kind of dependable power?*

"Sinews" that give cars "go." Connecting rods that Lycoming turns out for FORD trucks. *Can on-time delivery of precision parts in volume help you?*

Power generator for jets. Created by Lycoming for the U. S. AIR FORCE to start jets and bombers. *Can creative engineering help solve your problem?*

Even these few samples demonstrate that Lycoming has the machines you can use—the skilled craftsmen you can use . . . the immense facilities you can use . . . the creative thinking you can use! For a more complete story on Lycoming, write for the illustrated booklet, "Let's look at Lycoming."



FOR RESEARCH · FOR PRECISION PRODUCTION

LOOK TO LYCOMING

Lycoming Spencer Division, Williamsport, Pa. AVCO Bridgeport Lycoming Division, Stratford, Conn.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

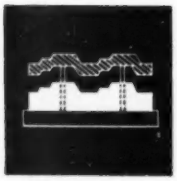
NEW general-purpose shell gives greater latitude

Bakelite Company announces the development of a new general-purpose shell molding resin that *can be subjected to a greater variation in operating conditions than ordinary shell molding resins.*

Shell molds bonded with this resin reach minimum usable strength in the curing operation faster than molds made with ordinary resins. They also retain their strength for longer periods at curing temperatures, permitting greater leeway in curing time.

This new BAKELITE phenolic resin reduces the tendency of the resin-sand mixture to fall off the pattern plate during the inverting operation.

Shell molds made with this new resin resist the tendency to distort upon ejection from the hot pattern plate, insuring better mating of mold halves. This hot rigidity is obtained without sacrificing toughness

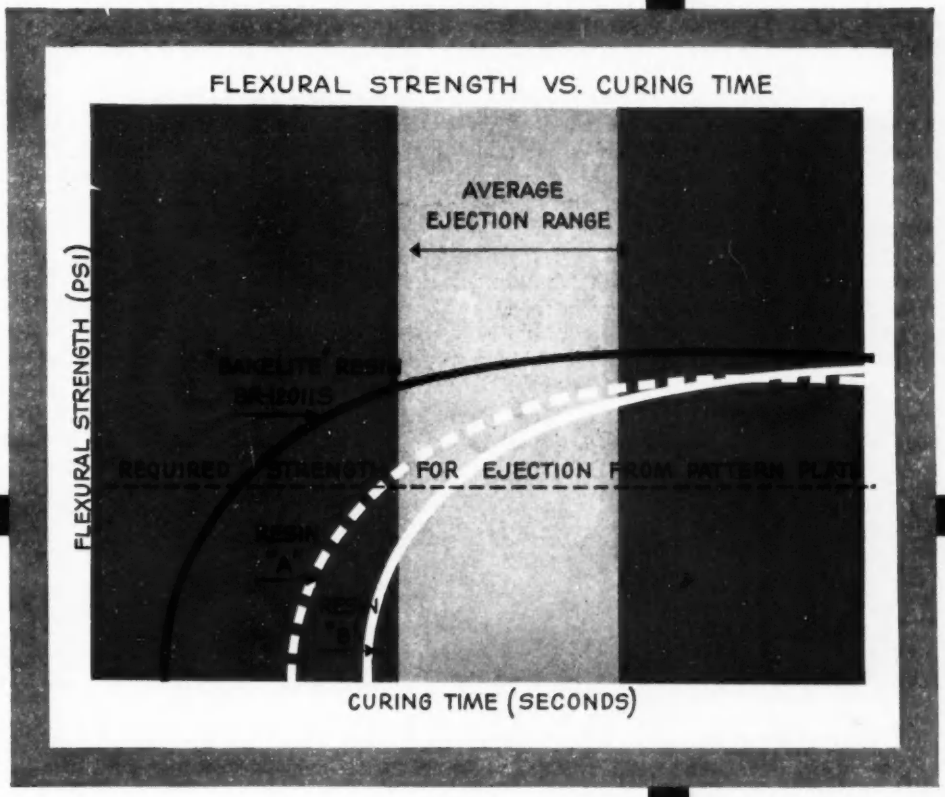


and provides molds that are more dimensionally stable, and which resist deformation during the pouring operation.

Field and laboratory tests of molds made with BAKELITE phenolic resins reveal a direct correlation between resin particle size and mold strength. In common with other BAKELITE phenolic shell molding resins, the new resin is finely ground, and is uniform both as to particle size and batch-to-batch production. The fine uniform particles give greater coverage per pound of resin. Smaller quantities of resin are needed to reach minimum usable strength, with resulting economies. This uniformity also eliminates the need for foundrymen to make extensive adjustments in formulation during production operations.

Your foundry department or supplier will be interested in this new shell molding development. Bakelite Company engineers, located in principal cities, can provide expert guidance in the use of phenolic resins. For the basic story on shell molding and the BAKELITE Resins developed for it, write Dept. QI-59.

molding resin in mold-making



BAKELITE Resin BR-12011S is resistant to distortion upon ejection from the hot pattern plate because of its high flexural strength when hot. Shell molds produced with this material will reach a minimum usable strength faster than ordinary shell molding resins, and will retain a strength in excess of this minimum for longer periods while still at curing temperatures.

BAKELITE
TRADE-MARK
RESINS FOR SHELL MOLDING

TRADE MARK

BAKELITE COMPANY
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New Italian Cars Introduced at Turin Automobile Show

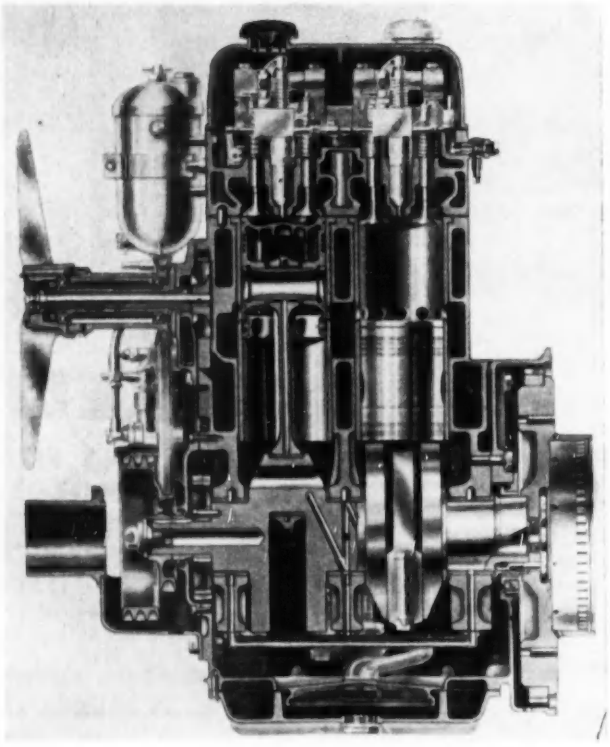
TURIN, ITALY

INCREASED in size to 270,000 sq ft, and with more than 400 exhibitors representing ten countries, the thirty-fifth Italian automobile show, held at Turin, Italy, April 22-May 3, was marked by the appearance of several new models from the home factories.

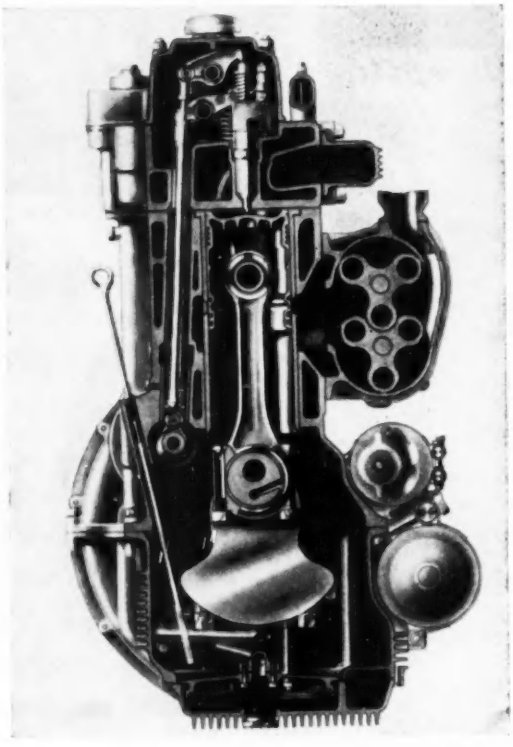
Lancia presented the Appia, a smaller V-four than any the firm has produced in recent years. Although it is small, the Lancia is a high-class car, which comes into a distinctly higher price range than the 1100 Fiat of practically equal size.

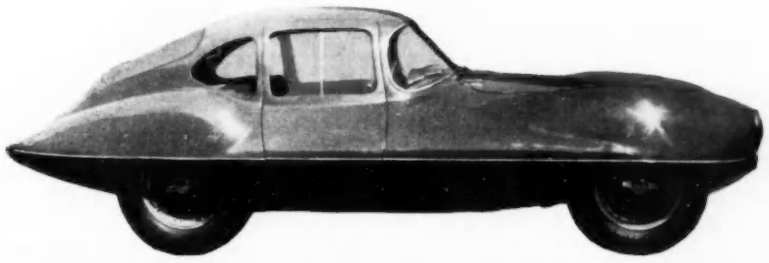
Characteristic Lancia features have been maintained in the new engine, which has its four cylinders in a single casting forming a 10 deg V. The iron cylinders, without liners, are bolted to a separate crankcase. Bore is 2.67 in., stroke 2.95 in., and piston displacement is 66 cu in. Compression ratio is 7.4 to 1 and horsepower is 38 at 4800 rpm. Because of the short overall length of the engine, the balanced crankshaft is carried in two main bearings. There are two chain driven camshafts on opposite sides, and the inclined valves in the head are operated through push rods and rockers. The exhaust is on the left and the carburetor, with its water jacketed manifold, is on the right-hand side. A hydraulic tensioner is used on the timing chain. Light alloy is used for the crankcase, oil pan, timing gear housing, clutch housing, ribbed transmission housing and its rear extension, as well as for the fan. The distributor, driven off the intake camshaft, is brought up to the top of the cylinder head and is

Longitudinal section of the Lancia two-cyl, two-stroke Diesel.



Transverse section of the Lancia two-cyl, two-stroke Diesel.





Alfa Romeo Flying Saucer sports model.

By W. F. Bradley
Special European Correspondent for AUTOMOTIVE INDUSTRIES

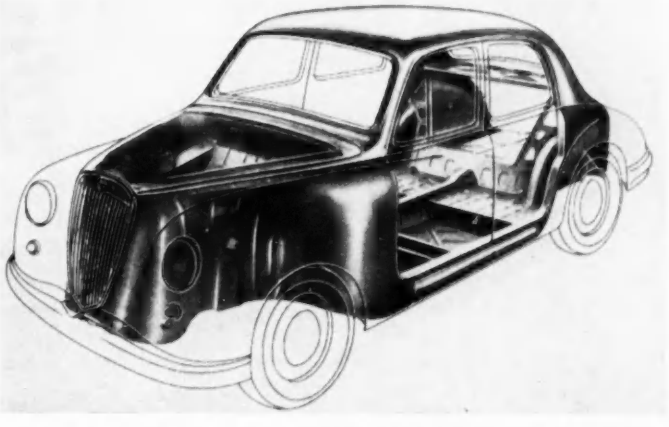
inclined rearwards, behind the carburetor. From the fuel pump, driven off the same camshaft, there is a straight vertical flexible feed pipe to the carburetor. The water pump is bolted to the front face of the cylinder block and, together with the two-blade aluminum fan, is belt driven. The same belt drives the generator on the left-hand side of the engine. The starting motor is located below the generator. There are two thermostats; one for the water outlet and the other for the radiator shutters.

The body is of welded sheet steel construction, particularly stiffened on the cowl and at the frame of the rear compartment, for there is no chassis frame nor center door posts. The doors are hinged respectively forward and rear and give full width opening to the interior. With a view to weight reduction, the hood, doors, rear fenders and trunk lid are of light alloy.

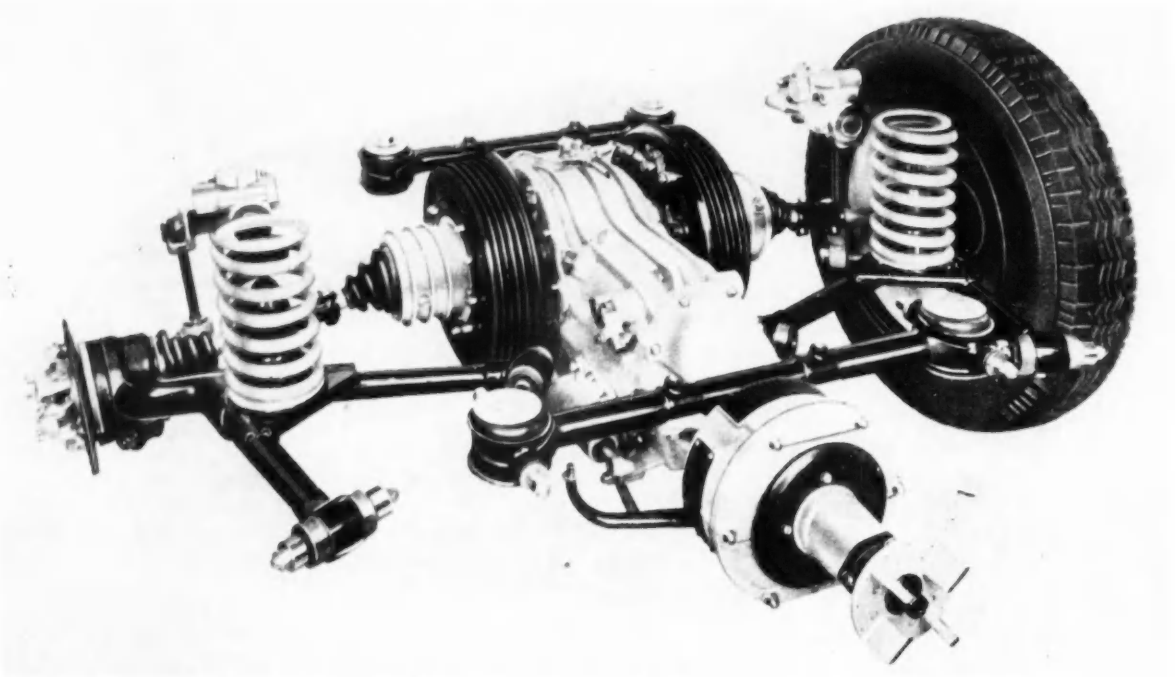
Front suspension is of the Lancia type, with enclosed vertical coil springs and hydraulic shock absorbers. Unlike the larger models, the transmission is a unit with the engine. It provides four speeds ahead, three of them synchronized. Hotchkiss drive is used with a hypoid rear axle. Springing is supplemented by vertical, hydraulic shock absorbers. With a wheelbase of 97⅝ in. and a tread of 46⅜ in., the weight with water, spare wheel and oil is 1800 lb.

Supplementing the V-six Aurelia, Lancia has added a high-speed touring model, with the bore and stroke increased from 2.83 by 3.20 in. to 3.07 by 3.36 in., which brings the piston displacement to 149.5 cu in. The compression ratio is increased to 8.4 to 1, and the maximum output is 118 hp at 5000 rpm, compared with 80 hp at 4800 rpm for the smaller model. Both models are distinguished by having clutch, transmission and suspended final drive at the rear, with inboard brakes and independently sprung wheels.

In the truck section Lancia presented a two-cyl, two-stroke supercharged Diesel in a two-ton chassis. While this company has produced Diesels for a considerable time, this is its first two-stroke engine. Claims made for it are higher efficiency, reduced weight and smaller dimensions compared with the four stroke. This engine, designated the Beta, has two vertical cylinders in a light alloy casting with steel liners and are 3.9 by 4.9 in. bore and stroke, giving a piston displacement of 119.7 cu in. It has a compression ratio of 16 to 1 and develops 42 hp at 2000 rpm. Two exhaust valves per cylinder are mounted vertically in the light alloy head and are operated from a camshaft through push rods and rockers. The injector is vertical in the head, between the pair of valves. The intake ports are uncovered by the piston 48 degrees before lower dead center. Injection is direct, the two injector pumps being driven off the valve camshaft. The crankshaft is carried in three bearings. The three-lobe Roots type blower is mounted on the left-hand side of the cylinder block, and is driven by triple belt from the crankshaft, the ratio being 2000 engine revolutions to 3200 blower revolutions. The belt-driven generator is under the blower and the electric starter below this. Pistons are in cast iron, with four compression and two oil rings. *(Continued on next page)*



Body construction of the Lancia Appia. It has no center door posts.

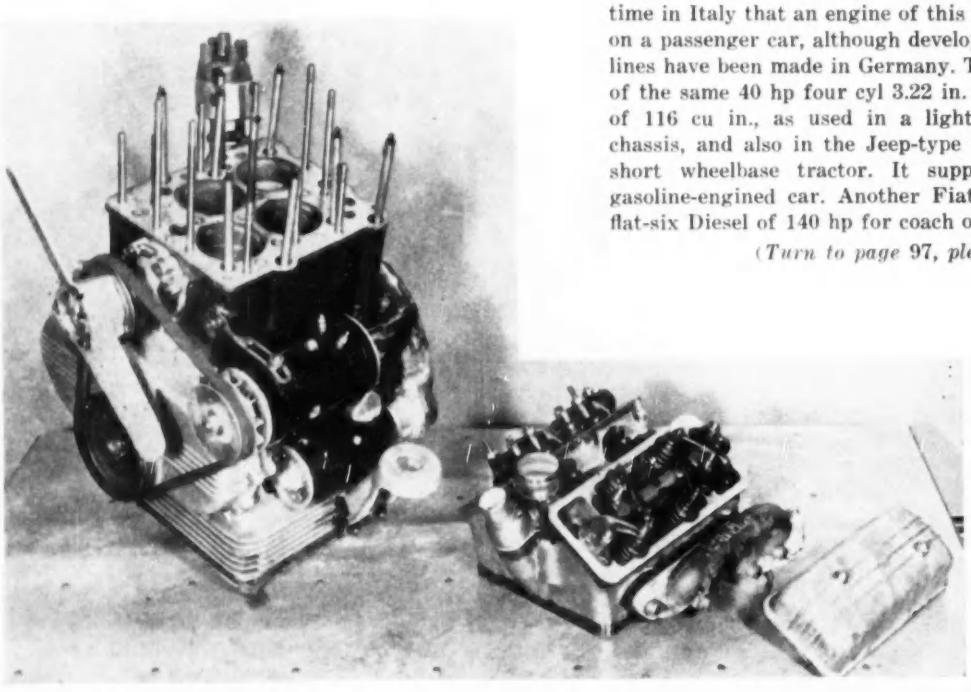


Clutch, transmission, and final drive form a unit at the rear of the Lancia V-six high speed touring model. Wheels are independently suspended, and brakes are located on the final drive case.

The five-speed transmission (the fifth speed is an overdrive) has a light alloy case and forms a unit with the engine. The engine is mounted forward in the usual position and the drive is carried to the rear axle by an open shaft with rubber universals. A distinctive feature is independent suspension of the front wheels by a transverse upper leaf spring and lower arms, supplemented by vertical hydraulic shock absorbers. The truck has a wheelbase of 100 in. Complete weight of the truck is 4136 lb and its useful load 4730 lb.

Another Diesel development is the **Fiat** 1400 passenger car with a heavy-oil engine. This is the first time in Italy that an engine of this type has been used on a passenger car, although developments along these lines have been made in Germany. The Fiat makes use of the same 40 hp four cyl 3.22 in. by 3.54 in. engine, of 116 cu in., as used in a light truck and a bus chassis, and also in the Jeep-type Campagnola and a short wheelbase tractor. It supplements the 1400 gasoline-engined car. Another **Fiat** development is a flat-six Diesel of 140 hp for coach or rail service. This

(*Turn to page* 97, *please*)



Lancia Appia V-four engine with cylinder head assembly removed.

Number of Vehicles in Sweden Increasing at Rapid Rate

By Hans G. Tonndorf

STOCKHOLM, SWEDEN

MOTOR vehicles are making large gains in Sweden. At the turn of the year there were about 470,000 motor vehicles in that country; 365,000 cars, 96,000 trucks and 8500 buses or, in other words, one car for each 15 inhabitants.

The present situation is, to a great extent, the result of the development which has taken place during the last few years. After a decade of being almost completely cut off from foreign supplies, the number of passenger cars rose in 1950 by 58,000, in 1951 by 60,560 and in 1952 by about 52,000.

However, there are indications that a change in the market situation occurred last fall. During past years dealers were able to sell almost any make of car, which resulted in the fact that in 1951 there were 175 different makes compared with some 30 during 1939. Lacking adequate service facilities in Sweden, many of these new automobiles will no doubt prove very poor investments. Now the buyers have become more discriminating, and price and quality again have become primary factors in their choice. But demand is high and is likely to remain so. A long-range study, undertaken by the Institute for Economic Research, indicates that there will be 660,000 passenger cars in Sweden by 1960.

The bulk of the Swedish car market still is supplied by foreign manufacturers. Despite the substantial increase in domestic manufacture, the importation of foreign cars is considerably greater than prewar. A fairly reliable estimate for the present year is as follows: 35,000 cars imported in finished state; 10,000 cars imported but assembled locally; 12,000 cars domestically manufactured (after deduction of exports has been allowed).

As will be seen from the table showing the importation of foreign-made cars and trucks in 1951 and 1952, Great Britain supplies more than one-third of the total. Germany ranks second and, reckoning in number instead of value, she now holds first place. Between 1951

(*Turn to page 92, please*)

1952 Imports of Motor Vehicles and Parts into Sweden

	ENGLAND		GERMANY		FRANCE		ITALY		NORTH AMERICA		OTHERS*		TOTAL	
	No.	1000 kr	No.	1000 kr	No.	1000 kr	No.	1000 kr	No.	1000 kr	No.	1000 kr	No.	1000 kr
Passenger cars	8,898	50,641	12,635	67,903	4,829	28,238	2,693	14,639	900	9,839	2,953	19,855	32,908	191,115
Trucks	2,112	14,600	2,114	15,104	222	1,529	19	80	477	7,971	497	2,678	5,441	41,882
Spare parts	.....	62,088	.....	23,975	....	2,192	....	1,371	....	41,461	....	4,335	.....	135,422
Car imports	11,010	127,329	14,749	106,982	5,051	31,959	2,712	16,090	1,377	59,271	3,450	26,868	38,349	368,419
Percentage		35%		29%		9%		4%		16%		7%		100%

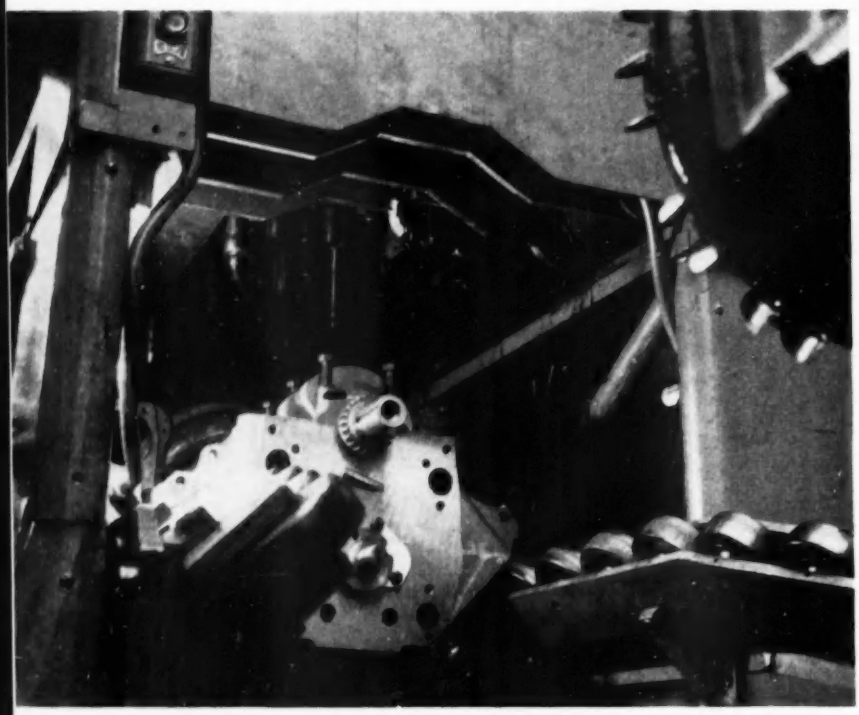
1951 Imports of Motor Vehicles and Parts into Sweden

Passenger cars	12,621	72,014	14,633	72,399	6,617	34,597	2,612	17,507	1,390	15,243	2,759	14,215	40,632	225,975
Trucks	1,812	9,672	1,731	9,046	304	1,780	42	216	1,103	7,482	49	156	5,041	28,352
Spare parts	.....	50,297	....	19,872	.....	5,320	.....	678	.....	67,564	.....	4,554	.....	148,385
Car imports	14,433	131,933	16,394	101,317	6,921	41,697	2,654	18,401	2,493	90,392	2,808	18,925	45,673	402,712
Percentage		33%		25%		10%		5%		22%		5%		100%

* Other countries—imports of passenger cars: 224 from Belgium; 474 from Holland; 193 from Denmark; 327 from Israel, which probably are transit imports of American cars. In addition, 793 passenger cars from Czechoslovakia and 662 from Soviet Union.

NOTE: "North America" does not include American transit imports, which at a rough calculation amount to about 1000 cars.

Latest Automatic Equipment at De Soto Engine Plant



Automatic nut runner for running the ten main bearing cap fastenings on the cylinder block sub-assembly. A block has just entered this machine from the assembly line to the right and the nut runner spindles immediately above are in readiness to come into engagement.

CONSIDERING the widespread installation of transfer machines throughout the industry, it is of more than passing interest to examine one of the outstanding operations to see where it stands after more than a full year of experience. We refer to the De Soto engine plant, considered to be a model push-button operation at the time of its open house late in 1951. It was first described in AUTOMOTIVE INDUSTRIES, December 15, 1951, with later articles March 1, and April 15, 1952.

It is a tribute to the judgment of the plant management as well as to the skill and know-how of the machine tool builders contributing to the De Soto program to learn that after more than a year of full-scale operation the performance of the transfer machines has exceeded the most optimistic estimates. From a maintenance standpoint, these machines have been relatively trouble-free. As a matter of fact, maintenance has been lower than on some of the previous older and simpler special purpose machines in use in the plant.

At the outset the electrical equipment for these machines, with its imposing array of control cabinets and hundreds of miles of wiring harness, was viewed with considerable skepticism. But the wiring job was done so well and the coding of circuits developed with such simplicity that electrical maintenance men learned to handle the accessory equipment with ease. As a matter of fact, trouble calls have been so infrequent that the cabinets are kept locked and seldom have to be opened.

Largely stemming from the excellent record established by the equipment in this plant, the management has found it feasible to make another step not considered originally. It will be recalled that this started as a push-button plant—push-button from the standpoint that each line was composed of a number of individual transfer machines, of different makes, each one operating independently under operator control.

By Joseph Geschelin

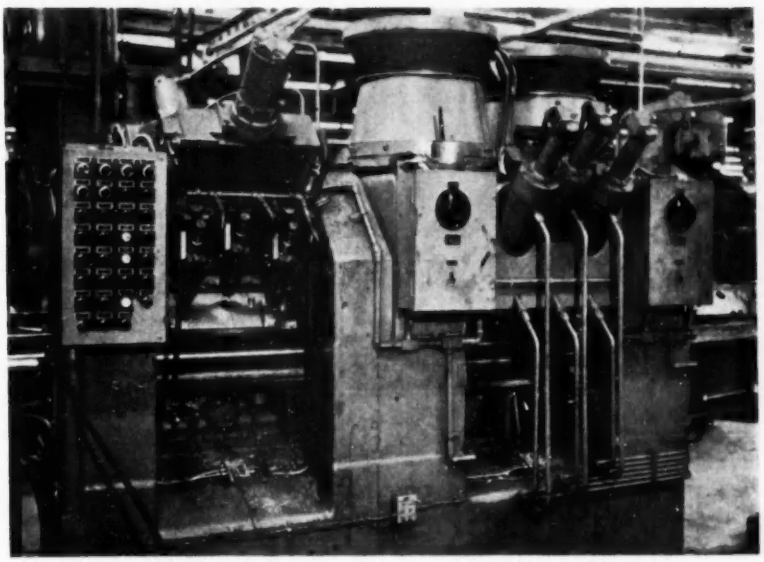
Now, however, the management has such confidence in the durability and trouble-free operation of the equipment that consideration is being given to tying the individual transfer machines on a given line into a unified machine eliminating the operators and control panels in between. This will be done by automation, bridging the existing gaps between machines by overlapping transfer bars. If this project goes through, each machine line will function as a single machine with an operator at the loading end for control, and one at the unloading end. This change will be facilitated by the foresighted action of providing, initially, an automatic inspection station at the terminal end of individual machines requiring such service.

It is noteworthy that automation already has been incorporated in the extensive transfer machine line for the cylinder head.

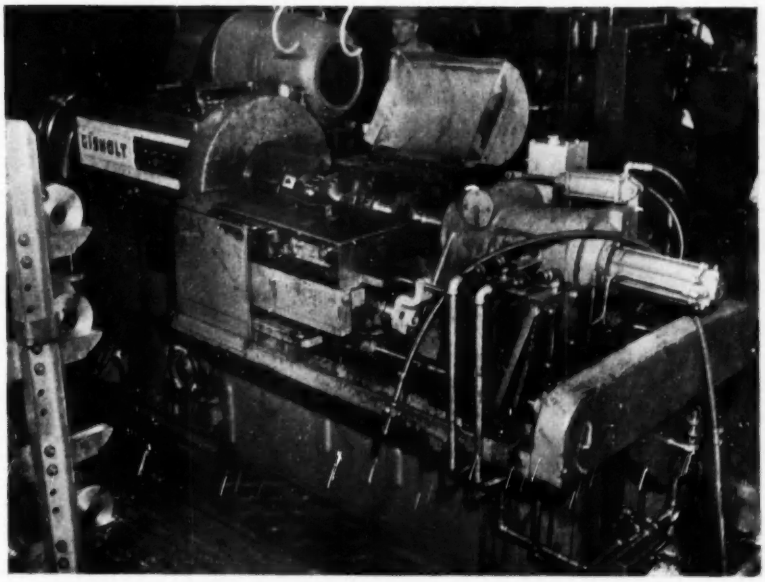
Although a fairly comprehensive high-spotting appeared in the articles mentioned earlier, De Soto has effected many improvements and has installed some new equipment since the last article was written. Accordingly, the following will serve to record some of the more recent developments.

One important improvement is found on the Greenlee transfer machine on the several stations concerned with the drilling and reaming of valve tappet holes in the block. Since the bores are held to a total tolerance of 0.0005 in., it has been found necessary to devise special means for holding this tolerance invariably and automatically. To this end they have installed a battery of infra-red lamps over the work stations and directed onto the reamers.

(*Continued on next page*)



This is the special machine, described in the text, designed and built by De Soto for pressing-in welch plugs in the cylinder block. At the left is the automatic station for applying sealer on the plug bore surfaces. The larger unit at the right does the pressing-in of plugs automatically. Above the station are two large hoppers arranged to feed welch plugs to each side through chutes, one of which may be seen directly in the foreground.



Closeup of Gisholt Simplimatic lathe for turning of V-8 crankshaft counterweights. Using solid square-shaped carbide tools, this lathe has floor-to-floor productivity of 50 shafts per hour, removing 1½-lb of steel from each shaft, on the average.

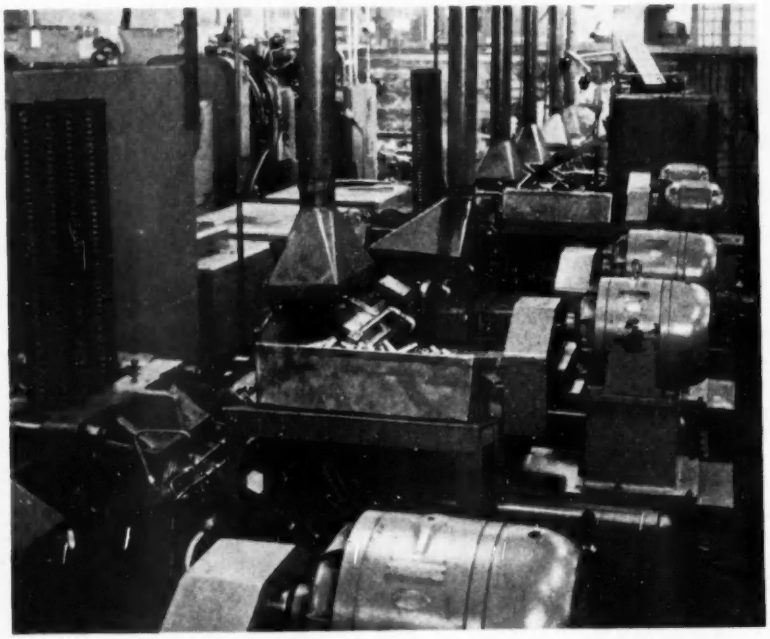
By this means the tools now are held at a constant temperature and will maintain constant size. This device eliminates the differences in temperature that may ordinarily exist between the tool and the mass of the work.

It was also found that an absolutely clean cutting fluid and positive removal of chips contributed largely to holding size as well as preserving the life of tools. To this end the machine has been fitted with a self-contained cutting fluid filtering system, employing a Barnesdril magnetic separator.

A troublesome problem was found with the pressing-in of large welch plugs. Leaks developed occasionally and these required repairs off the line. To correct this, De Soto engineers designed a special machine which is now installed as part of the Ingersoll finish-cam-boring machine. As illustrated, the machine has two stations. The first station, with three heads on each side of the block, coats the welch plug bores with a special sealer. Following this, the block is transferred automatically to the second station where a similar group of six heads presses the plugs securely in place. This station is fitted with hoppers which feed the plugs to the plungers through chutes. An interesting detail is that each mandrel in this station is fitted with a magnet arranged to hold the plug in proper alignment for pressing-in.

Automatic nut running is a striking development. On the final engine assembly line there is the stage where it is necessary to tighten the 10 main bearing cap bolts. Heretofore, these fastenings were handled on the line. Now there is in operation a special machine, designed and built by De Soto for automatically driving the bolts home, completing all 10 in one cycle while the engine is mov-

Closeup of last station of the Greenlee transfer machine on the cylinder block line. Reamers for valve tappet bores may be seen on both sides. Infra-red heating lamps, for maintaining uniform temperature of reamers, may be seen mounted directly overhead. A similar bank of lamps is employed at the preceding station, immediately to the right.



One section of the 23-station Heald transfer machine tooled for operations on valve guides and valve seats on De Soto V-8 cylinder heads. At the left are the four magazines for feeding intake and exhaust valve guides automatically to the work station for pressing into the head. Further along in the background is the Linde freezing cabinet for exhaust valve seats which are fed by chutes from the cabinet to the vertical magazines which may be seen just to the left of the cabinet.

ing on the conveyor. As illustrated, the machine is fitted with 10 Ingersoll-Rand nut runners and arranged for an automatic cycle which is initiated as the block enters the machine. At this point the tool head moves down to engage the work and moves with the work until the operation is completed. The entire cycle, naturally, is very fast. When the fastenings are driven home, the tools retract, the head raises and then returns to starting position ready for the next engine.

Something has been added by De Soto to assure the safety of its surface broaching machines. For example, on Cincinnati vertical Hydro-Broaches on connecting rods and caps there is the ever-present possibility that an operator may place the work improperly in the fixture. If this occurs, it is possible to destroy an expensive broaching tool—and possibly injure the operator. Now in cooperation with Cincinnati, they have worked out a safety switch device that watches the positioning of the work. If the part is installed properly the cycle goes on without interruption. However, if there is a mismatch the switch triggers the hydraulic circuit and prevents the ram from acting.

Production engineers never stop their search for improved methods of stock removal. One of the operations on the crankshaft — turning of counterweights — is done on Gisholt Simplimatic lathes, and was originally tooled with high speed cutting tools. More recently, De Soto changed the procedure radically by the adoption of solid tools of square-shaped carbide at each point. This has speeded productivity tremendously, decreasing floor-to-floor time quite dramatically. What is even more important from a management standpoint, the solid tools provide eight sharp cutting edges available without significant machine down time. Moreover, the time and labor and facilities initially required for tool maintenance have been materially reduced.

The operation consists of turning and chamfering six counterweights with floor-to-floor rate of 50 pieces an hour. The square carbide tool bits are held in Wesson cartridge-type tool holders. Cutting is done at 380 sfpm, with feed of 0.012 in. per revolution. Stock removal, on the average, is of the order of ¼ in. Altogether this Gisholt lathe operation removes around 1½ lb of steel from each of the shafts on the average.

Important also from the standpoint of management is that the eight cutting edges of the square tool bits are good for approximately 1200 crankshafts before grinding.

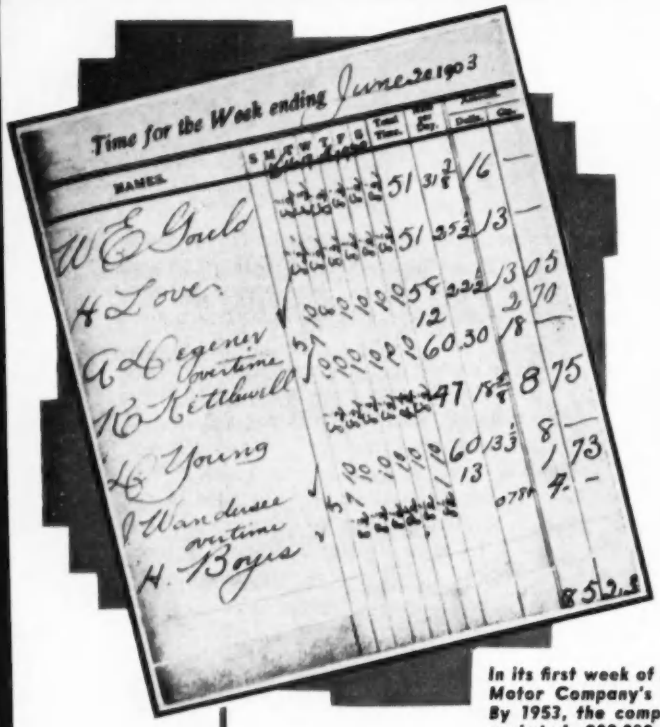
At the time the earlier articles on this plant were published, the outstanding transfer machine built by Heald for the cylinder head line was not yet in full operation. At this writing, it has been in operation for a long time and deserves mention in this article. It is a 23-station transfer machine, fully automatic in action, designed to bore valve guide holes, press-in valve guides, bore for valve seat inserts, shrink the inserts and press them in place, finish-bore valve guides, finish-ream valve guides, and finish generate valve seats.

Perspective of one of the two lines of Footeburt transfer machines on the cylinder head. Each one consists of two 15-station transfer machines. The first unit has 95 spindles, the second—44 spindles. Originally, these machines were operated as individual units but are now tied together into a single machine, controlled by one operator.

At Station 6 is a vertical magazine for feeding exhaust valve guides to the work station. At this point there is a drill unit which drills a ⅛-in. oil hole in each valve guide before pressing-in. Then the valve guides are pressed in place automatically. They are rough- and finish-bored at Station 8.

At Station 12 another vertical magazine is installed

(*Turn to page* 98, *please*)



In its first week of operation, in 1903, Ford Motor Company's payroll totaled $85.23. By 1953, the company's payrolls had skyrocketed 200,000 times—to more than $17,000,000 weekly. And the employes had increased by more than 168,000.

FORD *Reflects on the* PAST, *Plans for the* FUTURE *at* 50-YEAR MARK

FORD Motor Co. is reviewing a half-century of history this year as a preview of things to come. The official 50th anniversary date is June 16, when the company was founded by Henry Ford in 1903. To preserve the record of 50 years for posterity, the Ford Motor Co. Archives were dedicated May 7 at the home of the late Henry Ford—Fair Lane in Dearborn. More than 5,000,000 documents and personal papers covering the life of Mr. Ford and the company he founded are now available to historians and writers.

Two major ceremonies are scheduled at Dearborn. A new $80,000,000 Research and Engineering Center, part of a vast expansion program begun after World War II, was dedicated May 20 as a meeting place for ideas and ingenuity to produce a better life. The new $11,500,000 Styling Building, fourth in a series of new buildings there, is being completed in Dearborn, Mich. Future buildings are already under consideration. Plans call for the center to be completed in 1958 as a memorial to the late Henry and Edsel Ford.

In 1952 the Dynamometer Building, with 284,000 sq ft of floor space, was erected as the first major unit of the center. Two other structures, one for maintenance and the other for vehicle testing, also were completed last year. The vehicle test structure is part of an improvement program at the center's Engineering Test Track.

Other recent Test Track additions include a 4,600-ft straightaway, a "ride and handling" road with pavement hazards, a smooth-surfaced silent road with sound-reflector wall to magnify car squeaks, and a new track access layout to control greater traffic movement.

When completed, the Research and Engineering Center will cover a 750-acre tract, including the original area occupied by Ford's central engineering organization. Major units in that area are the Engineering Administration Building and Annex, Body Engineering Building, Engineering Research Building and Vehicles Testing Building.

The theme of "Progressive Research and Engineering" will be carried out in the remodeled Ford Rotunda, which will reopen June 16 as a public showplace.

Ford personnel and their families in the 28 states where the company has plants, and at Ford installations abroad, will hold "open house" during the summer to observe this 50th birthday. One June 17th, the company will be host to its dealers and their

Strange car at right helped set the automobile industry free. Henry Ford built it in 1907 from early French patents and used it in winning the famous Selden patent suit. Ford alone among early automakers fought Selden's monopolistic grip on the infant industry.

1953 Ford Victoria

wives at dinners to be held all over the nation.

There are more than 168,000 employes of Ford Motor Co. in the United States today. Today's employes account for a $17,000,000 weekly payroll—200,000 times greater than the $85.23 drawn by those eight workers in the first week of the company's existence.

"Ford at Fifty" is not only an anniversary, but the title of a book telling in words and pictures what goes on inside one of the world's biggest industrial companies. Half a million copies of the book, containing many color photographs, have been published by Simon and Schuster.

"Fifty Years Forward on the American Road" will be the story told on a two-hour top-talent television show on June 15, anniversary eve. An anniversary motion picture on the same theme is being produced.

A graphic account of the birth and growth of Ford Motor Co. is contained in a series of six paintings by Norman Rockwell which first appeared in an anniversary calendar distributed to more than 3,000,000 homes and business places over the world.

These are some if the things being done this year to commemorate the deeds of the man who said "there is only one thing that makes prosperity, and that is work."

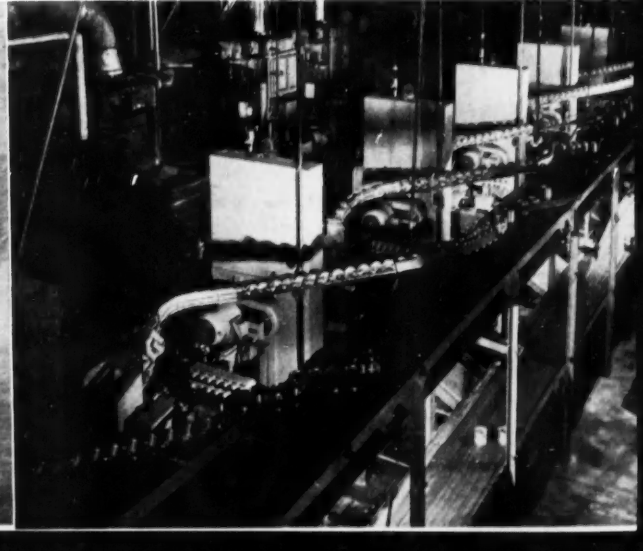
In the last eight years, the company has added 14 manufacturing plants, five new assembly plants

1913

History was made as the flywheel magneto, first manufactured part to be built on a moving assembly line, passed by workmen at Ford Motor Company's Highland Park, Mich., plant in the spring of 1913. Time required to assemble magnetos was reduced from 20 minutes to five minutes; the same principle was applied to all other Model T assembly operations and mass production of automobiles was born.

TODAY

Machining of aluminum pistons at Ford Motor Company's Cleveland Engine Plant requires 25 machines so tied together by automation equipment that the work is completely automatic. This view shows pistons being carried along a conveyor belt system which serves to move pistons in and out of machines and carry the pistons to succeeding machining operations. When the pistons are machined. They are dropped onto the bottom conveyor.



Engineering Firsts of Ford Motor Co.

1901 Left-hand steering.

1904 Torque tube drive.

1904 Engine mounted longitudinally with frame

1904 Bevel gear drive.

1906 Wiring harness.

1906 Unitary engine and transmission.

1907 Fin and tube radiator.

1907 Removable cylinder head.

1907 Electric resistance welding.

1907 Alloy steel (vanadium).

1908 Four cylinders cast en-bloc.

1915 Coach type body.

1920 Integral brake drum and wheel hub.

1921 Plastic steering wheel.

1926 First in U. S. with drop center rims.

1927 Safety glass as standard equipment.

1927 First hydraulic shock absorber on low-priced car.

1927 Drum type rear axle.

1927 Mushroom valve stems.

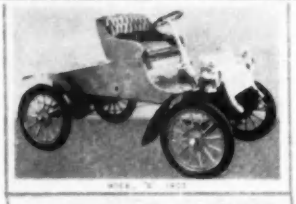
1927 Split valve guide.

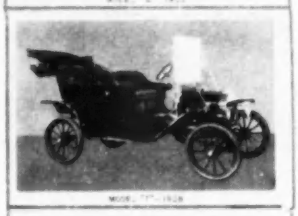
1931 Rustless steel.

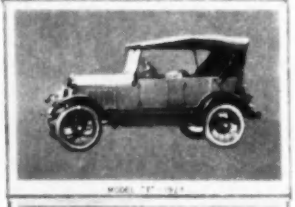
1931 Infra-red rays for paint drying.

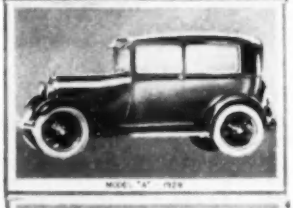
1932 First moderately priced V-8 engine.

1932 Full-length K-type frame.









1953 Ford Victoria

1932 Permanently sealed water pumps.

1933 Synthetic resin enamel on cars.

1933 Cast alloy steel crankshafts in regular production.

1934 Cast steel valve inserts.

1936 Alligator type hood.

1937 Battery in engine compartment.

1938 Straddle mounted bearings on axle pinion.

1945 First in industry to use isotopes in research.

1948 First in its field with completely redesigned postwar car.

1948 First in price class with automatic overdrive.

1948 First in its price class to use "black-light" instrument lighting panel.

1948 First in its field with 100-hp engine.

1949 First in industry to establish statistical quality control of production throughout its plants.

1950 First in its price class with autothermic pistons.

1951 First in its price class with automatic transmission using intermediate gear.

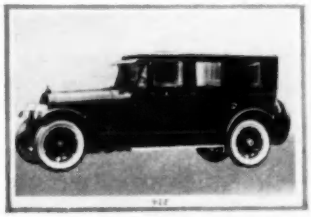
1951 First in price class with waterproof ignition system.

1951 Nodular iron castings for crankshafts.

1952 Suspended brake and clutch pedals.

1952 Convenient center-fill gas tanks.

1952 Ball-type wheel suspension.



First Ford-Lincoln—1922

First Mercury Car—1939

and 19 new parts depots or warehouses, besides expanding or modernizing some 30 other plants and facilities. The cost has been more than $900,000,000 to date. The next few years will see another $500,000,000 spent for such purposes.

• • •

The Next 50 Years

During the short span of 50 years, we have emerged from a relatively primitive state into an era which, with all its conveniences and advances, will be looked back upon 50 years hence, as having been relatively primitive. Wherein lies our assurance that progress will continue? Man's inherent curiosity to extract nature's secrets and his proven ability to add fragments of knowledge, coupled with imagination and enthusiasm provide an equation having a self-evident answer.

Are there physical facts upon which to build? Most certainly there are many. For example:

1. The efficiency theoretically available in the conversion of heat into mechanical energy is many times greater than that actually realized. The thermal and mechanical efficiencies of present-day power systems are of the order of 20 to 30 per cent of those theoretically available. 100 per cent thermal efficiency is possible only where infinite temperature differences are obtainable. Such a system is inconceivable of practical attainment. However, thermal efficiencies of the order of 50 and 60 per cent are within the realm of obtainable reality.

2. The ultimate strength and quality theoretically present in materials have likewise been only partially obtained in practice. For example, present-day steels are one-tenth as strong as molecular theory reveals they can be. The conversion of silicon into ductile and high-strength structures could revolutionize the materials industry.

3. The future is replete with promises for better things through the application of atomic science. The expansion of electrical power from nuclear reactors is occupying the attention of many capable men and is now in a formative period. Radiation has a pronounced influence on the composition and reaction of materials,

FORD MOTOR CO.

Historic Dates and Events

1863 July 30 —Henry Ford born Springwells township farm, Wayne County, Mich.

1889-90 —Begins experiments on internal combustion engine.

1893 Nov. 6 —Son, Edsel B. Ford, born.

Dec. 29—Henry Ford begins work on two-cylinder gasoline engine.

1896 June —Completes first car at 58 Bagley Avenue, Detroit.

1902 Aug. 16—Limited partnership agreement drawn up by Henry Ford and Alexander Malcolmson, Detroit coal dealer.

1903 June 16—Ford Motor Company files articles of incorporation; $150,000 capital stock; $100,000 issued; $28,000 paid; 12 stockholders; Mr. Ford is named vice-president and chief engineer, receives one-quarter of stock for car design.

July 23 —First car, two-cylinder Model A, sold.

1904 Aug. 17—Ford Motor Company of Canada, Ltd. incorporated near Windsor, Ontario.

Sept. 14—Ford is first car manufacturer to mount engine longitudinally with frame; also first to use torque tube drive.

1906 Oct. 22 —Mr. Ford succeeds John S. Gray as president of company; acquires 58½ percent of stock.

1908 Oct. 1 —Model T introduced; first production model with left-side steering.

1909 June 1 —New York City to Seattle endurance race starts, won by Model T in 22 days. In an era of poor roads, this proves that the Model T was

the most versatile car in America.

1910 Jan. 1 —Production begins at Highland Park, Mich., plant.

1911 April —Industry's first branch assembly plant completed in Kansas City, Mo.

1913 Spring —Moving assembly line for magneto introduced.

1914 Jan. 5 —Five dollars daily wage for eight hours' work announced; replaced scale of $2.34 for nine-hour day; 10,000 men seek employment at Highland Park, Mich., plant next day.

1915 Dec. 10 —1,000,000th Ford car built.

1919 Jan. 1 —Edsel B. Ford succeeds Henry Ford as president.

July 9 —Ford Motor Company reorganized as a Delaware corporation to give wider scope to its operations; Henry Ford, Edsel B. Ford, F. L. Klingensmith, directors; capitalization $100,000,000.

Sept. 27—Henry Ford and Edsel B. Ford become sole owners of company.

1922 Feb. 4 —Lincoln Motor Company purchased.

1923 —Record production year; 1,923,360 Model T passenger cars, trucks, and Lincolns built in U. S.

1924 June 24 —10,000,000th Ford built.

1925 Oct. 31 —Record production of 9,109 Model T's in one day.

Nov. 25—First Ford tri-motor plane completed.

1927 Feb. 10 —First radio-range system guides Ford plane from Cleveland to Detroit; radio beam later given to government and now is one of most important factors of aviation safety.

Dec. 2 —Model A introduced.

1928 Nov. 1 —Ford Motor Company first to use safety glass as standard equipment.

1931 April 14—20,000,000th Ford built.

1932 Mar. 9 —First Ford V-8 built.

1933 Jan. 8 —Final Ford tri-motor plane completed; total built 196.

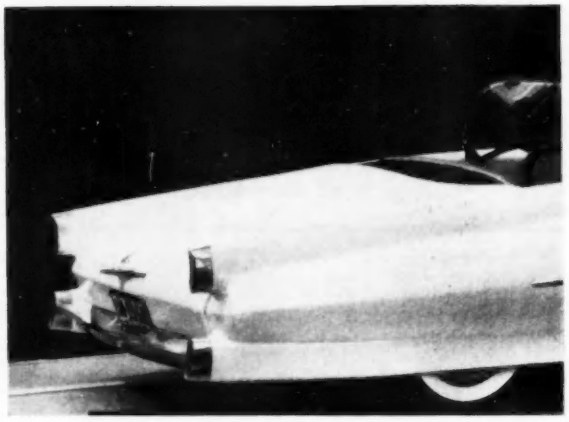
1938 Oct. 8 —Mercury production starts.

1941 June 20—UAW-CIO receives its first closed shop contract with check-off of dues; 123,000 employees covered.

1942 Feb. 10 —World War II halts civilian car production.

1943 May 26 —Edsel B. Ford dies.

. . . . . FORD . . at . . .



Ford Motor Co. Production
1903 Through 1952

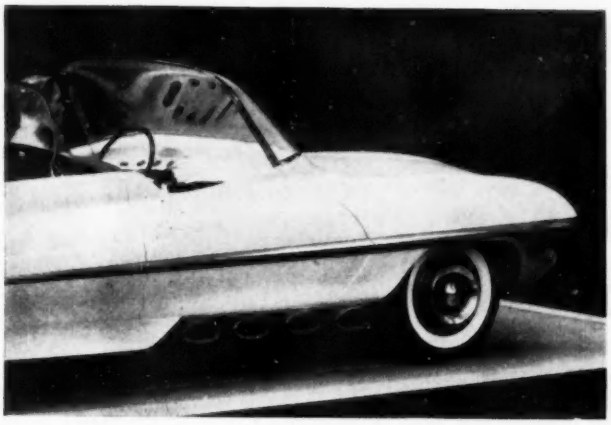
Year	Total Production		
1903	1,708	1927	555,796
1904	1,695	1928	833,514
1905	1,716	1929	1,967,741
1906	8,828	1930	1,517,023
1907	15,214	1931	771,444
1908	10,526	1932	451,591
1909	18,257	1933	515,488
1910	33,333	1934	872,849
1911	72,567	1935	1,368,139
1912	177,834	1936	1,233,943
1913	215,186	1937	1,378,201
1914	322,545	1938	797,566
1915	530,329	1939	1,009,598
1916	768,691	1940	1,099,538
1917	722,222	1941	1,157,121
1918	572,154	1942	416,456
1919	1,047,858	1943	307,455
1920	582,647	1944	321,973
1921	1,050,741	1945	283,920
1922	1,425,830	1946	898,202
1923	2,201,188	1947	1,319,655
1924	2,083,481	1948	1,423,888
1925	2,103,541	1949	1,726,203
1926	1,752,075	1950	2,364,508
		1951	1,928,579
		1952	1,678,957
		Total	43,919,514

and may eclipse presently-employed means and methods for effecting chemical reactions. Radioactive tracer techniques are rapidly assuming the front in analytical processes.

Why have these problems not been solved before? Things which were incomprehensible a short time ago are made simple and understandable today through the application of past knowledge, experience, demonstrated experiments, and intellect.

Man must constantly improve the tools with which he solves these problems. Devices and methods for

50-YEAR MARK . . . *(Continued)*



Scale model of a true hardtop convertible sedan shows how the top can be completely concealed under the rear deck lid. The rear windshield can be lowered with the top under the deck lid, left in position behind the rear seat, or swung overhead and down until it rests behind the front seat as shown above.

Engineers and design stylists, working with clay, model a car of the future.

detecting and controlling minute quantities and qualities of materials and processes are examples of such aids.

Fifty years ago we thought of minuteness in terms of molecules, grams, centimeters, feet per minute, volts, etc. Today, minuteness is measured in millionths of each of those values. Modern life depends upon the control of these infinitesimal quantities. The future will depend increasingly upon the separation and combination of smaller magnitudes of force, weight, and size. —*A. A. Kucher, Director of Ford Scientific Laboratory.*

1943 June 1 —Henry Ford re-elected president.

1944 Aug. 31—Willow Run plant hits peak monthly production of 432 Liberator bombers.

1945 Jan. 1 —Civilian truck production resumes.

June 28 —Last Liberator bomber assembled at Willow Run; Ford Motor Company completes World War II assignment with the manufacture of 656,400 units, including 8600 bombers, 278,000 Jeeps and 57,000 aircraft engines.

July 3 —Ford passenger car production resumes.

Sept. 21—Henry Ford II named president.

Oct. 22 —Lincoln-Mercury Division established to assemble and market Lincoln and Mercury passenger cars.

1946 May 16 —Ernest R. Breech named executive vice-president, elected a director.

1947 April 7 —Henry Ford, 83, dies at his home in Dearborn.

April 18—Henry Ford's will made public—non-voting stock left to Ford Foundation.

1948 Jan. 30 —Benson Ford elected vice-president of company and general manager of Lincoln-Mercury Division.

1949 Feb. 15 —Ford Division organized to assemble and market Ford cars and trucks.

Sept. 28—New non-contributory pension plan, first for hourly paid workers in the automobile industry, announced.

1951 April 1 —Ford Motor Company Fund announces annual awards of four-year college scholarships for children of employes.

1952 July 24 —Special Product Operations, a new organizational component of the company, created; William Clay Ford named manager.

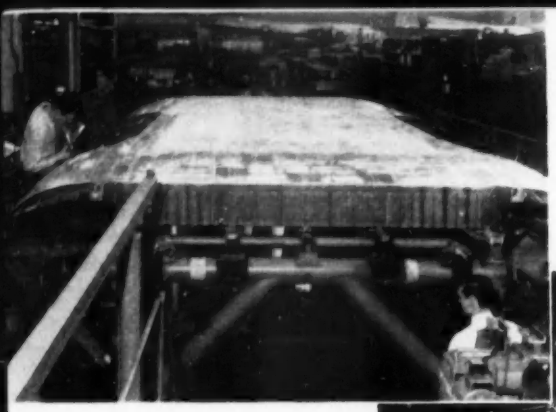
Dec. 11 —Henry Ford II reveals that Ford Motor Co. is second largest enterprise in the automobile industry.

Dec. 31 —Ford-built cars and trucks, including those manufactured abroad, since founding of the Company in 1903 total 43,919,514.

1953 Jan. 1 —Ford Motor Company's defense production contracts total more than $1,500,000,000.

June 16 —Ford Motor Company observes 50th anniversary.

Massive Fixtures Required for Making



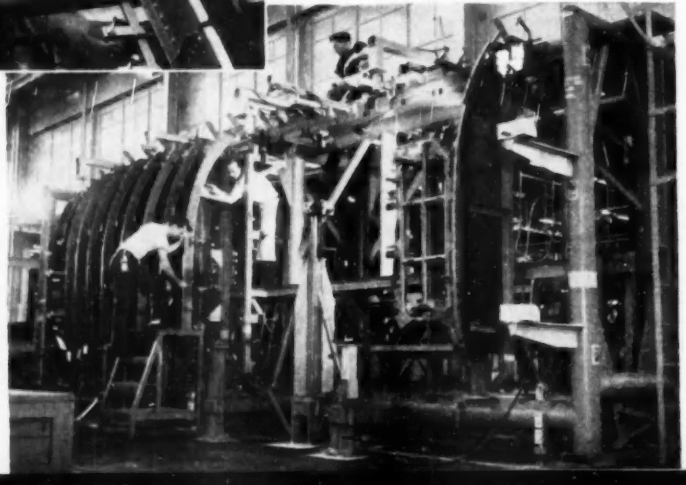
Cargo deck section, first major index to be completed on each C-123B.

Huge spar mill used to shape aluminum spars for the plane's 110-ft wings.

WITH most of the tooling completed for the manufacture of the Chase C-123B assault transport, Kaiser-Frazer is ready to embark on the mass production of this new airplane at Willow Run. The accompanying illustrations represent a sampling of equipment and some of the major framing fixtures which have been approved and from which a number of parts and sub-assemblies already have been produced.

At this stage it is anticipated that production will be greatly facilitated through use of extrusions for the great variety of members used in the airplane, thus reducing the volume of pre-

Forward roof section fixture which is typical of the massive tooling at Willow Run.



Rib channels being attached to forward fuselage side panel fixture.

Condensed Specifications C-123B

Length overall	75 ft, 1 in.
Height overall	34 ft, 1 in.
Span	110 ft
Wing area (incl. ailerons)	1223 sq ft
Fin area	127 sq ft
Stabilizer area	217 sq ft
Weight empty	30,122 lb
Maximum pay load (with fuel load of 879 gal and 50 gal of oil)	14,080 lb

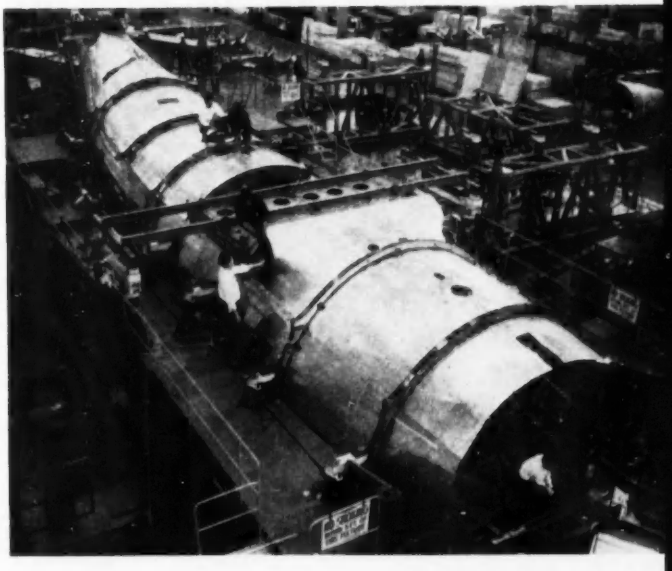
C-123B Transport

Chase C-123 advanced assault transport.

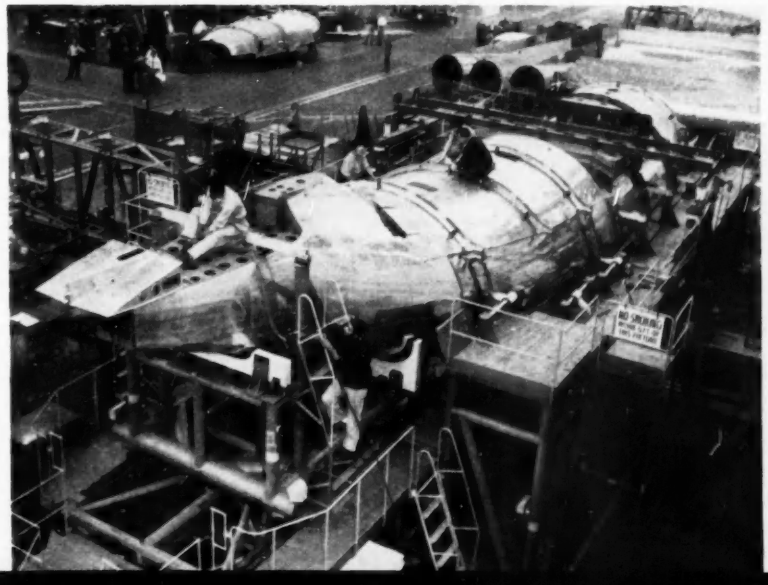
paratory press shop operations usually required, and at the same time producing a structurally superior plane.

The illustrations emphasize the massiveness and bulk of the many individual framing fixtures built for the Chase line. Fabricated of large tubular members, these fixtures are extremely rigid. Basic attachment points on each sub-assembly are said to be held to a total tolerance of 0.001 in. and, where there is a complex or cluster of attachments for bolting sections together, to a tolerance of 0.0005 in.

It is explained that the reason for such extremely fine tolerances is the requirement of complete interchangeability of major sections, doors, etc., in the field. The procedure adopted on the Chase airplane is claimed to make possible the replacement of these sections in the field without resorting to fitting or relocation of basic fastenings, or use of partially finished parts.



One of four fuselage mating fixtures used on the Chase C-123B job.



Aft view of fuselage of the assault transport.

Soviet

PRESENTED here are some selected views of Russian cars and trucks supplementing the article "Soviet Automobile Industry Expanded and Partially Modernized" which appeared in the

The power unit of this MAZ 525 27-ton dump truck is said to be a 2362 cu in., four-stroke, 12-cyl Diesel engine developing 300 hp at 1700 rpm. Drive is to the rear wheels only.

Main conveyor at the Dniepropetrovsk plant. The dump trucks shown have a capacity of 3½ tons.

The two-ton GAZ 63, one of the few Russian front wheel drives. Its six-cyl, 212 cu in. gasoline engine develops 70 hp at 2800 rpm.

Rated at four tons, the ZIS 150 is powered by a six-cyl engine which develops 90 hp at 2700 rpm. It has air brakes and a five-speed transmission.

Liquid petroleum gas is used as a fuel in the GAZ 51B. In general, it is similar to the GAZ 63, except that the engine is modified to use LPG. Note the four gas tanks mounted under the body.

Vehicles

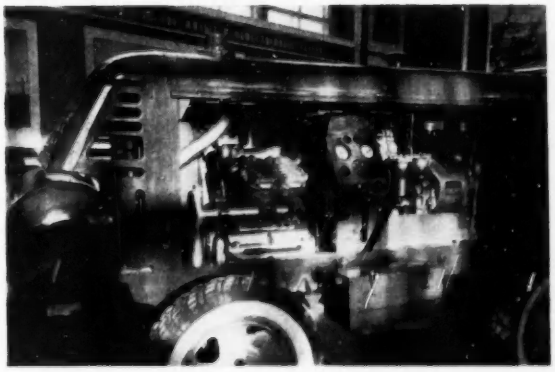
May 15 issue of AUTOMOTIVE INDUSTRIES. Details of most of these vehicles will be found in the table of specifications included in that article. This extensive table is on pages 50 and 51.

Wheel alignment and inspection at end of assembly line at the Molotov Auto Works in Gorky. Car on front-end is a 90-hp, four-door ZIM sedan.

Molotov plant in Gorky. Cars in the foreground are Pobeda M-20, five-passenger, four-door sedans. This model is powered by a four-cyl, 50-hp engine. The ZIMS at the right are 90-hp, six-passenger sedans.

Moskovich four-door, four-passenger sedan. Its four-cyl engine develops 23 hp at 3600 rpm.

Trailer-mounted, four-cyl, V-type, aircooled compressor. It has a capacity of 160 cfm.

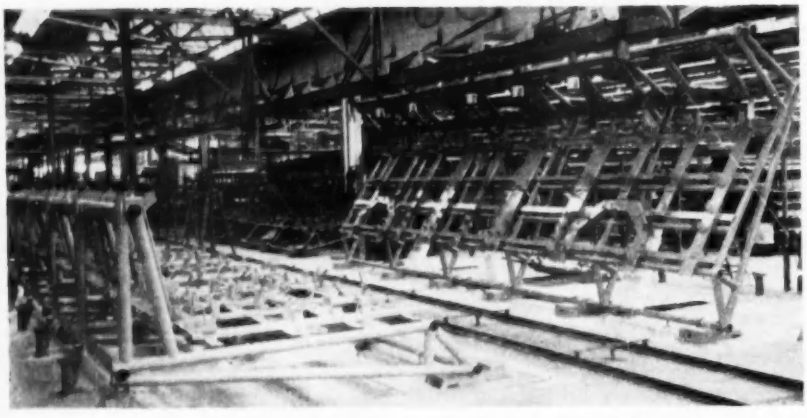


The YaAZ, a 6 x 4 dump truck, is rated at 13 tons capacity. Its six-cyl Diesel engine develops 165 hp at 2000 rpm. Drive is by individual shafts to each of the two rear axles.

Special Fixtures Eliminate Welding Stresses in

By Thomas Mac New

AVOIDANCE of welding stresses in a complicated structure and maintenance of true alignment of the parts within close limits is the principal object of a unique type of welding buck used in producing Mack buses. By precise positioning all of the members of the side and roof framing horizontally and locking each piece firmly in place before welding, the structure is unified in a relaxed position and without the usual strains and stresses.



This view of the butterfly wings illustrates one half in the horizontal position, while the other half is being raised to the vertical.

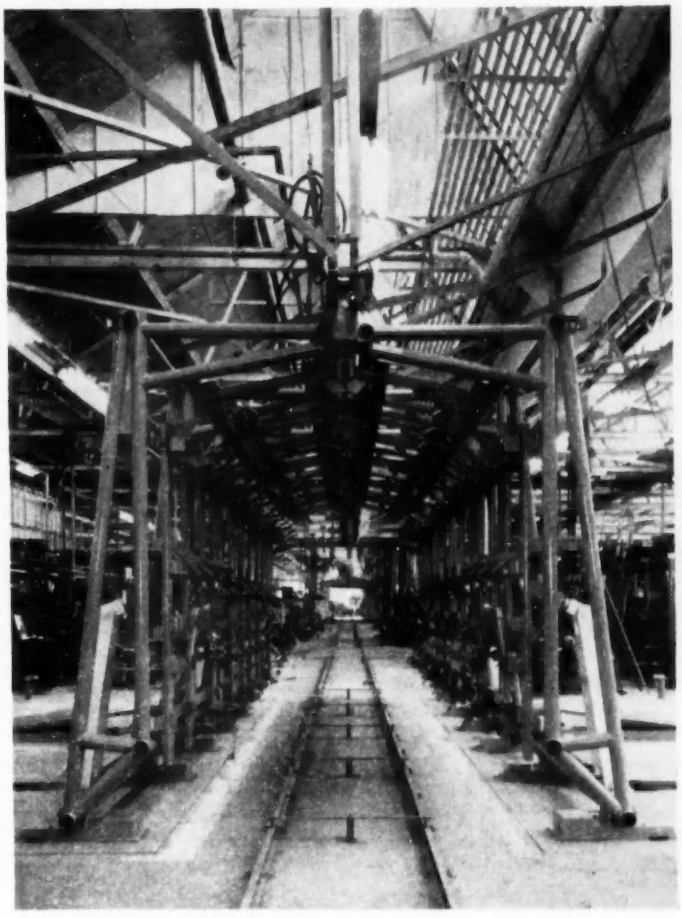
The butterfly fixture is used for assembling, welding and positioning the body side structure of Mack buses. The fixture is in the process of being raised to position.

It has been found that internal stresses set up within such a structure when welded by usual methods are responsible for cracking and distortion in service under conditions well within design anticipation. By eliminating such pre-stressing the full potential strength and rigidity of the design are developed by the finished structure.

One of the major features of the fixtures, two of which have been designed and built by the Mack Manufacturing Corp. for its Allentown, Pa., bus plant, is the extreme versatility which is so necessary for economical production of a line of different sizes of buses. With the two "butterfly" fixtures now in use, it is possible to construct any of the new bus models, regardless of length or width.

The butterflies, so named because of their operating characteristics rather than because of fixture design, are being used for building buses from 380-in. to 479-

Bus Bodies



Latest of the two butterfly fixtures, this unit is in the fully raised position. This illustration, taken especially for AUTOMOTIVE INDUSTRIES, shows the unique construction of the jig. Note the U-shaped sections at the center-rail.

in. long which are capable of carrying from 37 to 50 passengers. Any width from 96-in. to 104-in., can be handled by the fixtures.

As each butterfly is independent of the other in respect to production, both fixtures may be used simultaneously. Operations performed on the huge jigs include assembling, welding, and positioning the body side and roof structural members of the buses.

Considering fixture design, the unit, made in two halves like large butterfly wings, consists of a scientifically laid out framework with quick-acting toggle clamps, as shown in the accompanying illustrations. Each wing of the fixture is mounted trunnion style and is hydraulically operated from a horizontal position a full 90 deg to the vertical. When raised into position, the wings are locked into place at an overhead center-rail. The center-rail for the first butterfly designed by Mack consists of an L-shaped section equipped with steel dowels, while the latest fixture utilizes small U-shaped sections for locking the carline halves at the roof.

Width changes are made by removing blocks from the base of the wings and using a worm drive to propel each wing in the desired direction. Another feature of the versatile jigs is that they can be inched when it is required.

Although basically the same in operation and purpose, the two fixtures are somewhat different in design. The first one to go on the production floor was built in four sections. Each wing consists of two sections, one section for the side members and the other for clamping and welding of roof members. When the operations were completed, the clamps holding the roof members were released and the butterfly wing carried the entire assembly to the vertical position. With the latest type fixture each wing is an integral unit with the roof clamping mechanism attached to the jig for the side members.

For assembling the bus side rails or sills, stringers, carlines, wheelhouse panels and the many other structural members that make up the transit bus, each half of the butterfly lies in a horizontal position at a convenient working height from the floor. This eliminates much tedious manual handling in placing the materials in an upright position.

After positioning and clamping the multitude of structural members into place, these members, which make up the sides and top of the vehicle, are welded to form an integral unit. As the operations are being carried out, a bus underbody or underfloor, which has been previously fabricated, is rolled along steel tracks into correct position between the huge butterfly wings.

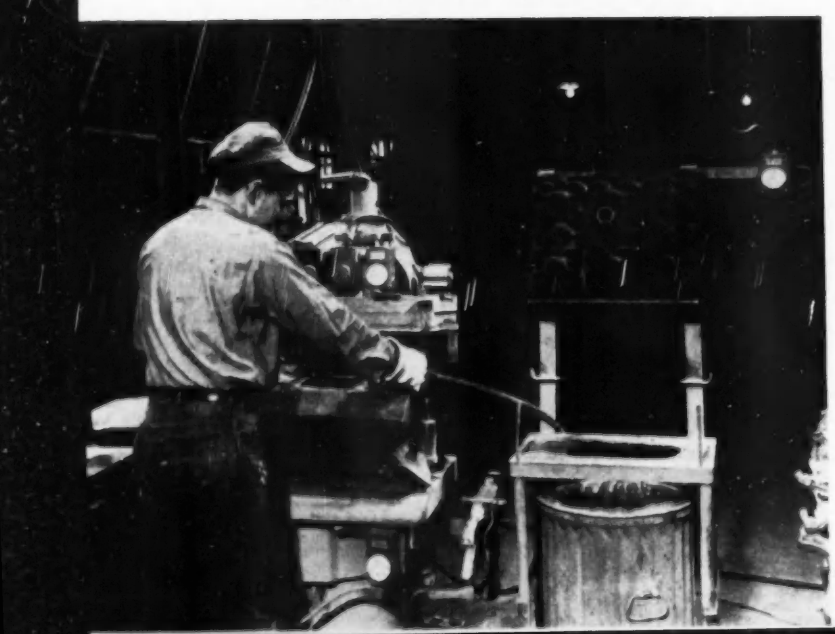
At this point the hydraulic mechanism is brought to play to raise each fixture half to the vertical. When it is completely raised and locked into position, the carline halves are joined together at the center-rail. The side framework of the vehicle is then fastened to the underbody so that an integral shell is formed. Next, the unit is moved along the line for attachment of the front and rear ends and the many other necessary finishing operations.

Pouring shells on a continuous-type conveyor. After being poured, the shells remain on the conveyor for a short cooling period.

Shell Molding's Outstanding Opportunities for Foundry Advancement

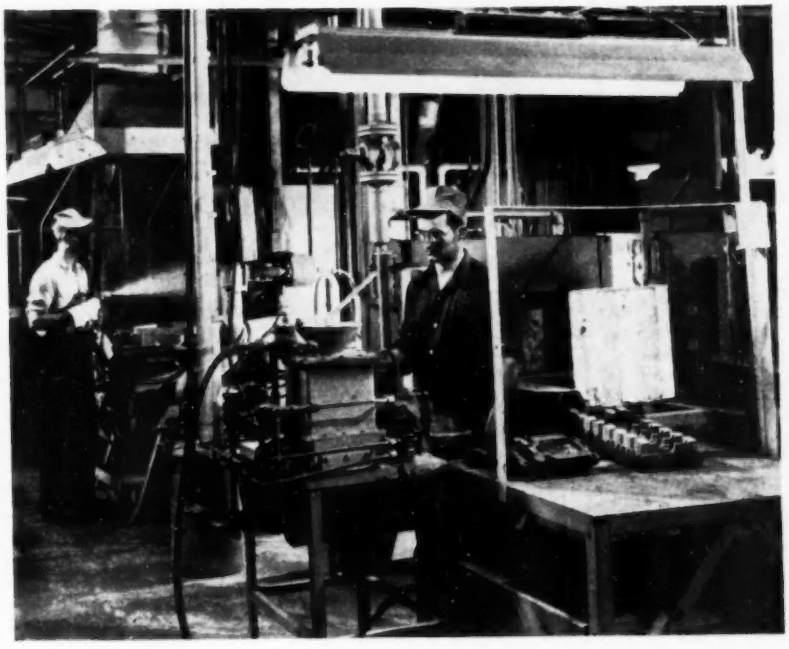
A NEW molding technique has been developed called pressure molding, which utilizes pressures up to 500 psi as compared with pressures of 50 psi or less being used at the present time. This method produces a very smooth and accurate casting. Proponents of this molding method are very enthusiastic regarding the future of the process. It would not be surprising if, within a few months, some plants were in production, using these high-pressure molding machines with resin additives to the molding sand. These resin additives improve the workability of the sand through uniform clay distribution, eliminating any clay balls. The result is increased flowability of the sand with uniform hardness molds on both vertical and horizontal mold surfaces, producing castings needing a minimum of cleaning. The trend in molding-sand technique is definitely in the direction of reduced cleaning time and closer tolerances.

Gluing the shell. The operator is positioning the gluing fixture which vibrates dry resin onto the drag shell. He then gets the cope half from the sprueing fixture, places it on the drag half and touches the controls which automatically move the squeezehead of the gluing machine into position. The machine presses the halves together for a predetermined length of time to firmly bond the shell.



The shell process is considered one of the greatest technical developments of our time in the foundry industry. It may revolutionize foundry molding techniques to the point where it will be more economical to produce most small castings, and some large castings, by the shell-mold process as compared with conventional, green-sand molding.

Complete mechanization of the molding operation on high-production runs is



Internal shell-making machine with baking oven located directly behind the operator.

high-volume production, using practical manufacturing methods. There is every reason to believe that sometime in the future, as the technique is further developed, it will be possible to cast many surfaces to much closer dimensional tolerances.

Cost of the phenolic resins used to provide the bond material for the silica grains in the construction of the shell is the main reason for the process not being more widely used. There seems to be little chance of a reduction of the present high cost of phenolic resin because of the stable price of phenol. Manufacturers are striving to discover suitable resin substitutes and resin extenders. Our research laboratory has a continuous program to try to find a substitute for phenolic resin or a material which can be blended with phenolic resin to produce a less expensive mix. If it is possible to use a material which would bring the price of the bonding material down to 10¢ or 15¢ a lb, I believe most everyone would use the shell process for the production of small castings. Even at the present high resin cost, many castings can be produced at a cost comparable to green-sand molding. This is particularly true (*Turn to page* 112, *please*)

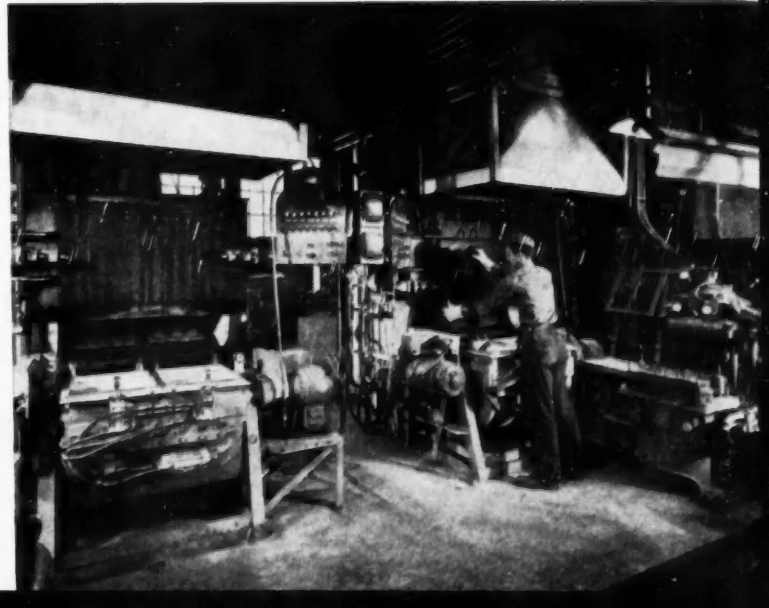
By James H. Smith
General Manager

Central Foundry Div., General Motors Corp.

possible using this process. Several machines which accomplish this are already on the market.

The shell process is usually considered a precision casting process. It is usually thought of as being between green-sand molding and the lost wax technique. At Central Foundry Div., GM, we are approaching the shell program from the standpoint of producing a better casting for less money and, at the same time, holding the dimensional tolerances to closer limits than with our present green-sand method. We are not promising tolerances to the degree where machining can be entirely eliminated. Some of the claims which have been made regarding tolerances have been very misleading. We know that it is possible to hold very close limits of castings made in experimental laboratories using laboratory methods, but we know also that the same results are very difficult to obtain in

Two automatic shell-making machines which are operated by one man. The machine on the left is starting the cycle while the machine on the right has just completed the cycle.



Studebaker's Body Plant

By Joseph Geschelin

INTRODUCTION of Continental-styled cars by the Studebaker Corp. was accompanied by a virtual revolution in production facilities for the manufacture of 1953 bodies. In the process most of the body plant was completely recast to accommodate new equipment, improved methods, and conveyorization. Today the body plant is entirely new and features miles of overhead conveyor lines for the transportation of sheet metal from storage to the fabrication lines, from fabrication lines to body assembly.

It may be of interest to learn that the 1953 Studebaker body requires approximately 3528 welds to complete the structure. It is particularly noteworthy that the new body program resulted from close cooperative action between the body plant specialists and body designers at the engineering end. This was done to assure the most economical manufacturing procedures in keeping with functional requirements as well as durability of the body structure. As it was finally developed, the current body operation relies primarily on spot welding, although some gas welding is done at various critical points wherever it is found sealing and structural strength are dominant requirements.

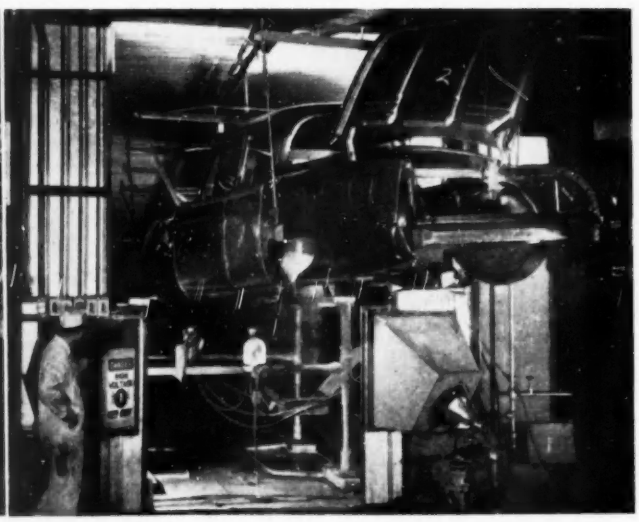
The smaller component subassemblies for the bodies are prepared on the second floor of the building, the entire fabrication floor being departmentalized and fitted with specially-designed framing fixtures. One example will suffice to indicate the methods employed here. This is the front end assembly framing fixture, as illustrated. Major feature of the fixture, carried out in principle on all other fixtures, is the absence of all external structural elements that ordinarily tend to interfere with free access to the work. Overhead-mounted welding heads and transformers are grouped conveniently to facilitate handling by individual operators.

Another noteworthy feature of these fixtures is the employment of air clamping, with individual valve control for each clamp. This eliminates all reliance upon the operator, and assures positive clamping at each point.

In the case of the front end assembly, mentioned

This closeup of one of the front end framing fixtures is typical of such fixtures for other subassemblies. One of the air valves may be seen at the left. Use of air-operated clamps affords easy access to every part of the subassembly for welding operations.

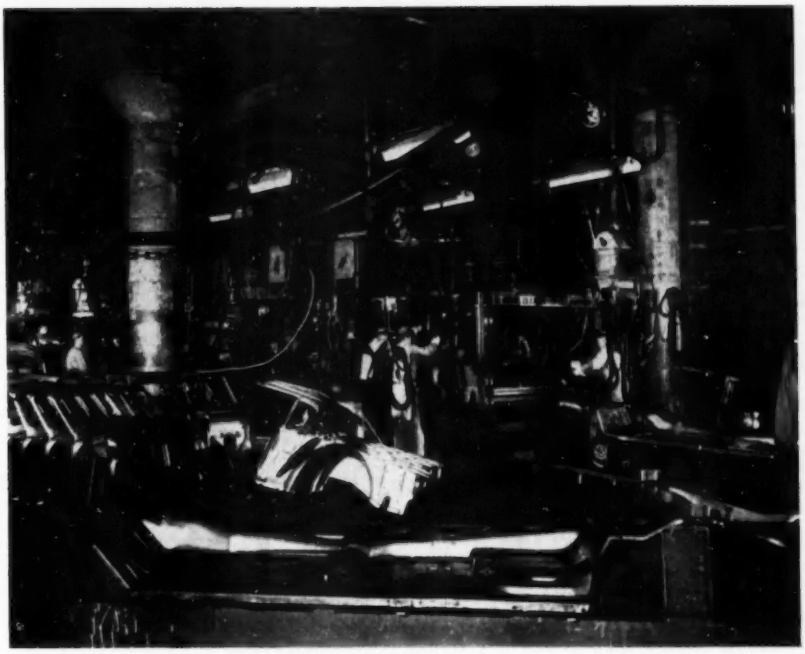
Studebaker body is seen entering the Ransburg electrostatic spray booth for automatic painting of underbody. As shown, bodies are transported through the booth while mounted on the overhead conveyor, raised high enough to clear the banks of spray guns which may be seen in the foreground.



Redesigned for 1953 Cars

above, as the operation is completed the subassembly is removed from the fixture, then suspended on the overhead conveyor for transportation to body framing on the first floor.

Preparation of the underbody assembly, a rather complex job in any body shop, is done in one of several batteries of Progressive multi - spot welders. The setup for standard coach underbodies as well as for the Land Cruiser is illustrated here. In each instance there is a battery of three Progressive welders — one for completing the front section, one for the rear section, and a larger machine for joining the front and rear sections



Perspective view of one of the 10 body framing lines at Studebaker. Directly in the foreground is a glimpse of the floor conveyor on which the framing trucks traverse the framing lines, each one carrying an underbody in fixed position. Immediately to the right is a framing truck ready for entry into the fixture.

Painted bodies, fresh from their trip through the paint shop, are transported to the final assembly line on the overhead conveyor system seen here.

into an integral underbody.

Perhaps the most interesting machine is the latter, if for no other reason than the fact that it is larger and more complicated, and is responsible for producing 300 spots in one setting. An outstanding feature from the standpoint of production management is that this unit is fitted with controls capable of selecting a cycle for conventional underbodies; then it can be changed in a matter of a few minutes to control the special cycle for Land Cruisers.

Closeup of the big Progressive multi-spot welder for joining front and rear sections of the underbody. It produces a series of 300 spot welds in an automatic cycle.

Examination of the illustration will show that the welding guns, even though spaced closely together, do not permit sufficient clearance to handle all the welds required for a given seam. Consequently, the machine cycle is arranged to automatically weld a line of spots, then retract the head, index over automatically, and produce a row of welds between the others so as to have the proper number of closely spaced spots along one seam.

For Land Cruisers the cycle is completely automatic but is more complicated because the underbody is longer. For economy, this underbody employs the standard front and rear sections, joining them with a four-in. wide strip. It can be appreciated from the foregoing that the additional strip requires an extra row of spot welds at the joint. While this is still done with the same welding head, it requires a cycle in which the welding head as well as the overhead die spot welds one seam, then indexes four in. to catch the second seam. It then returns to the first seam, indexes laterally to complete the additional spots; then indexes four in. to the second seam and again repeats the normal lateral indexing at this point to complete the welds.

The machine is more expensive than a conventional one but it permits a production job on Land Cruisers without requiring additional equipment or hand work.

Body assembly on the first floor has been handled skillfully. It required considerable study in the planning to accommodate the framing lines within the confines of available space. As illustrated, each framing line is composed of four stations, two on the conveyor and two in massive framing fixtures. Because of the length of these lines, it was necessary to arrange them at an angle of 60 deg with respect to wall lines. Thus there are 10 parallel rows of framing lines extending along the length of the building.

Running lengthwise along the building are two parallel conveyor lines—one on the floor for transporting the body carriage on which the body is built; the other a raised conveyor line onto which the welded structure is unloaded from the framing line and on which the final detail welding operations are completed before bodies are routed to the body-in-white lines.

The operation starts at the extreme end of the building. Underbodies are transported to this point on overhead conveyors from the welding machine and each one is loaded onto one of the massive framing trucks riding on the floor conveyor. It may be noted that the buggies are prototypes of a Studebaker chassis frame, providing proper dowel locations and fastenings at various points for holding the underbody securely on the buggy in the same position as on the final assembly line.

As framing trucks approach a specific body framing line, one is rolled off the line and turned slightly to meet the framing line. Here they have rails in the floor, accurately aligned with the framing fixtures and running right to the conveyor on the other side. Framing trucks ride these rails and, consequently, are accurately aligned within the fixtures.

The massive framing fixtures have been given meticulous attention to effect a design free from interference with the operators and welding guns. To this end most of the air-operated clamps, wherever possible, are located inside the structure. The first open station is used for installation of subassemblies such

(*Turn to page* 108, *please*)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Heavy Equipment Being Readied for Aircraft Production Program. Purchase of Machine Tools for Civilian Production at All-Time High.

Heavy Equipment for Aircraft

The Aluminum Co. of America is having installed in its Lafayette, Ind., plant a huge stretch press that will have 3 million lb pull. It will be used in conjunction with the Nation's aircraft production program by straightening and relieving strain in large aluminum parts. The parts will be made on either of two large extrusion presses of 14,000 and 20,000 tons capacity at the Alcoa plant. According to Alcoa, the complete stretcher will be about 180 ft long and about five ft wide with a total weight of approximately 2,100,000 lb. It will be capable of handling pieces of metal up to 110 ft in length and of straightening shapes up to 60 sq. in. in cross-sectional area in 75S aluminum alloy. The stretcher column shown in the accompanying illustration is 138 ft long and weighs 123 tons. During the stretching operation, it is estimated that the column may shorten as much as ⅝ in.

Also from Alcoa, we learn that ground has been broken for a building which will house two massive forging presses which are part of the Air Force's heavy press program. The building, which will be located adjacent to Alcoa's Cleveland works, is scheduled for completion early next year. Both of the presses, of 35,000 ton and 50,000 ton capacity, are supposed to be in operation by January, 1955. The 35,000 ton unit is being built by United Engineering and Foundry Co., and the 50,000 ton press will be supplied by Mesta Machine Co.

Over in England, High Duty Alloys has installed what is claimed to be the largest forging press in Europe. Called the Goliath, the huge hydraulic press provides working pressures up to 12,000 tons and will be used for the British aircraft program. The press itself weighs 800 tons and has a total height of 56 ft. One-quarter of the height is buried in an underground chamber. Three gas-fired furnaces feed the press with raw material; each furnace has a 10 ton capacity. According to the British, the press, which cost well over a $1 million, was financed by the company.

Uranium Machinery

In Fernald, Ohio, the Atomic Energy Commission has put into operation a primary and finishing mill that was expressly designed for the production rolling of uranium. The AEC plant, which is being operated by the National Lead Co. of Ohio, produces uranium for use in AEC fissionable materials plants throughout the country. The rolling equipment was designed and built by Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., after several months of painstaking research and development. (*Note illustration below.*)

Tool Orders At Eight-Month High

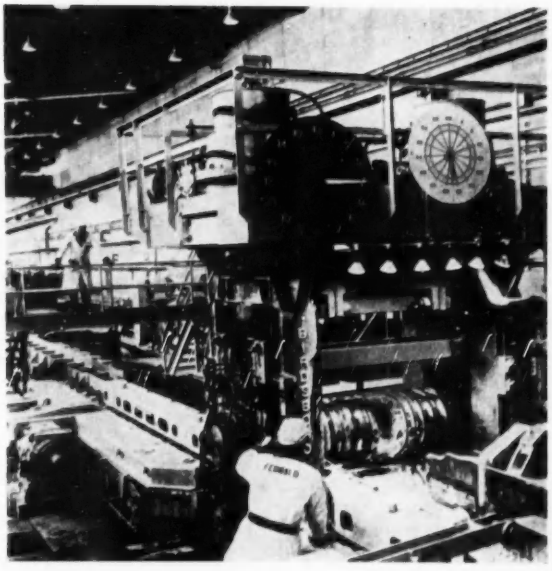
New machine tool orders in March approximated $95 million, largest volume since last July. Shipments in March were the highest in 11 years and with production outrunning new orders the industry's backlog declined to 8.6 months' output from nine months prevailing in February. Order cancellations remained at about 12 per cent for the month.

Although defense orders are slackening off, the purchase of machine tools for civilian goods production is at the highest rate in history, according to Tell Berna, general manager of the NMTBA. He said that American industry is speeding modernization in its plants. He added that an increase of five per cent in productivity in the Nation's metalworking equipment would equal the installation of all machine tools built last year.

Foundry Meeting

The American Foundrymen's Society featured five days of technical sessions at its 57th Annual Convention held in Chicago last month. Featured speaker was James H. Smith, general manager, Central Foundry

(*Turn to page* 116, *please*)



This Birdsboro primary mill, followed by a continuous Birdsboro finishing mill, is used to roll uranium into bars for further fabrication into slugs used in nuclear reactors.

NEW EQUIPMENT PLANT • PRODUCTION

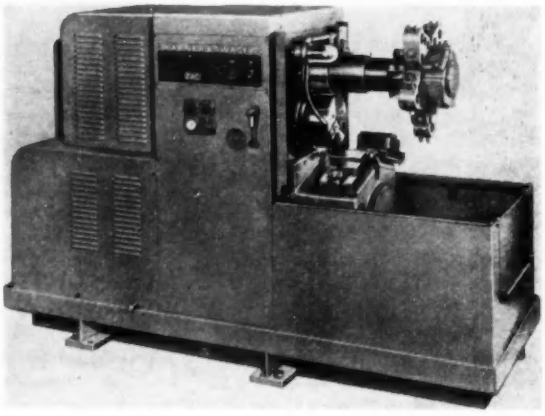
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

Single-Spindle Automatic Chucking Machine

The 2-AC single-spindle automatic chucking machine that is now available is a larger capacity model of the company's 1-AC. Designed for diversified production, the 2-AC features front and rear cross slides and a five-faced overhead turret, and handles work up to 10½ in. diam and up to nine in. in turned length.

Trip-blocks are positioned in the slots of a pentagonal drum at the rear of the turret shaft to control feeds, spindle speeds, length of cutting stroke and skip indexing. Either or both cross slides can be selected to operate with any or all turret faces, and an adjustment controls late and dwell cross slide operation.

Set-up controls include feed and speed selectors, automatic and hand-operation switches, and forward, reverse and index push buttons. Operating controls include spindle and coolant control switches, and cycle start, motor start and stop push buttons. A 15 hp, 1660 rpm (full load) reversing motor is used.



Warner & Swasey single-spindle automatic chucking machine, Model 2-AC.

Spindle speed range of the 2-AC is from 40 to 1102 rpm, and six automatically selected speeds are available in either of two ranges.

Thirty-six feeds are available, from 0.0019 in. to 0.124 in., from which six may be automatically selected.

Either or both of the eight in. wide cross slides can be operated with any of the turret faces, feeding at the same rate. Maximum travel of the slide is 4½ in.

Rapid traverse and indexing brake permit fast approach strokes. *Warner & Swasey Co.*

Circle E-1 on page 81 for more data

Industrial Fluoroscope for Mass Inspection

A fluoroscope, known as the Scopemaster, has been designed for the mass inspection of light alloy castings made by sand, permanent mold, die or other techniques; and also for the inspection of plastic products.

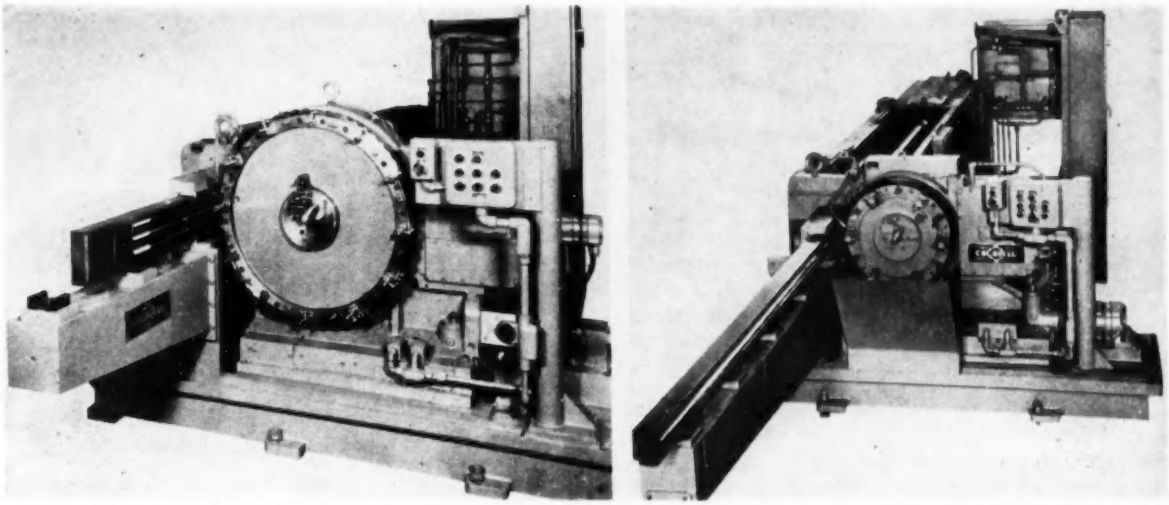
It is useful for mass inspection of concealed assemblies, hydraulic mechanical or electrical components; and for quick and efficient guidance of new-product development in the laboratory.

Of interest is the mechanism provided for moving the product in the X-ray beam on a special turntable. A single external control handle permits moving of parts to be inspected in any lengthwise or crosswise direction while in the X-ray beam. In the case of castings, this facilitates inspection of fillets and corners. The distances between the receiving screen and the product part may also be adjusted by the operator during the inspection.

GE Scopemaster.

The unit operates from a 110 v 60 cycle source. It has a nine in. by 19 in. front opening through which products are inserted for viewing. Internal cavities 0.040 in. in size, or approximately six per cent of the metal thickness in an aluminum alloy casting, can be detected. *General Electric Co.*

Circle E-2 on page 81 for more data



At the left, a Colonial broach machines three external scallops, while the machine at the right broaches external slots in jet engine rings.

Machine for External Broaching of Jet Engine Parts

Horizontal broaching machines have been developed for the automatic broaching of external scallops or slots on different types of jet engine rings.

The machines are basically standard 10-ton, 60-in. and 10-ton, 90-in. stroke horizontal broaching machines. The 10-ton, 60-in. machine broaches three scallops with each pass of the ram. The 10-ton, 90-in. broaches a single dovetail slot with each stroke. Fully automatic, the work shuttles into the cut and the ram starts. At the completion of the stroke, the fixture recedes away from the broach cut, and the ram returns to starting position.

Part is then automatically indexed one increment, and the process is automatically repeated until all slots or scallops are completed; then the fixture automatically recedes to loading position. Pneumatic or mechanical ejection for the finished part is optional on the machines.

Hydraulically actuated shuttle movement, which slides on the base using box type square gibs, is mounted low to allow mounting of large diameter work piece. Positive mechanical locking is provided to secure work in broaching position.

Indexing, hydraulically driven, is through change gears and a Geneva movement, controlled by limit switches, and with positive plunger locking. Selective electrical circuits are provided for fully automatic operation, single indexing, or independent inching motions, including both forward and reverse. *Colonial Broach Co.*

Circle E-3 on page 81 for more data

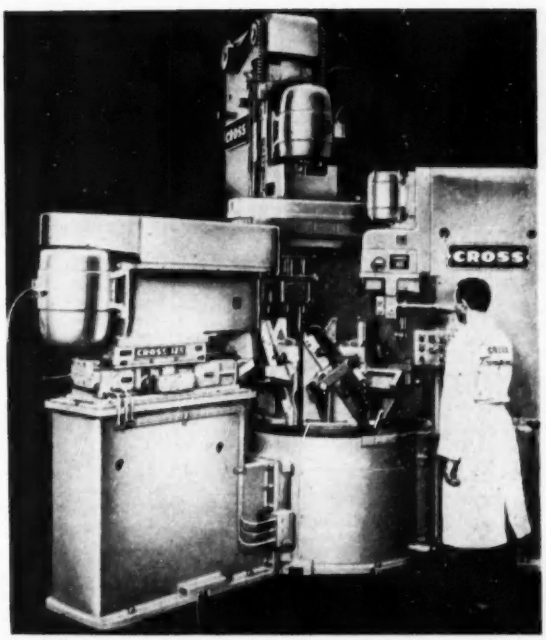
Six-Station Exhaust Manifold Machine

A special machine for milling, boring, drilling, chamfering and tapping the exhaust manifold tail pipe pad for six-cyl engines has been brought out.

The five operations are performed at the rate of 120 pieces per hour at 100 per cent efficiency. Parts are held on a fluid motor-driven index table with six stations—one for loading and unloading and one each for milling, boring, drilling, chamfering and tapping.

Hydraulic and electrical construction is to Joint Industry Conference standards. Other features include hardened and ground ways, hydraulic feed and rapid traverse, individual lead screw feed for tapping and automatic lubrication. *Cross Co.*

Circle E-4 on page 81 for more data



Six-station exhaust manifold machine.

(*Turn to page 76, please*)

NEW EQUIPMENT PLANT • PRODUCTION

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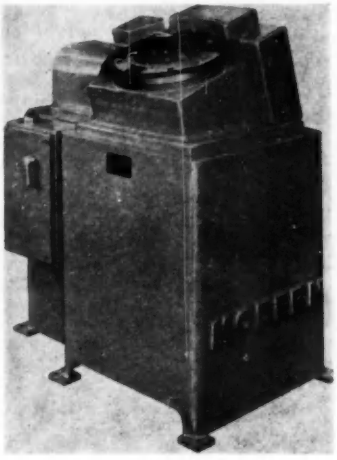
(Continued from page 75)

Machine for Chamfering and Deburring



Modern chamfering and deburring machine.

Burr-Master Model BM-2029, for chamfering and deburring flywheel ring gears is now in production. The machine is said to deburr and chamfer all the teeth of a 14-in. diam., 156-tooth flywheel ring gear in eight sec. cutting time.

The gear is loaded into the machine by slipping it over three rolls on the fixture, and into mesh with a drive gear. A locating finger, moving with the cutting tools, automatically locates the gear teeth radially on each stroke of the form-type cutting tools.

With the drive gear indexing continuously, chamfering begins as soon as the gear to be cut is meshed with it. A combination rocker arm motion actuates the form tools to provide a generated cutting action, which enables the tools to chamfer and deburr all tooth edges well around the root of the gear tooth. Depth of cut is readily adjustable.

Automatic indexing takes place during the return stroke of the tools. With the tools reciprocating at five strokes per sec. and chamfering four teeth with each stroke, cutting rate is 20 teeth per sec.

When cutting cycle is complete, a cycle indicator light signals that the gear is ready for removal. The operator depresses a lever to eject the gear by lifting it up and out of mesh with the drive gear. *Modern Industrial Engineering Co.*

Circle E-5 on page 81 for more data

Automatic Painting Machine Mounts Up to Four Guns

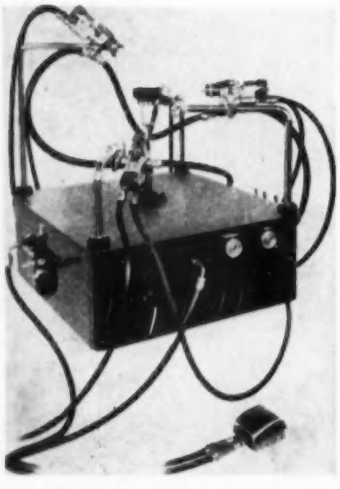
An automatic, single-spindle painting machine is being produced as a portable package which can be used in most standard spray exhaust booths.

One dial regulates the spindle speed for 100 to 400 rpm, while a second dial controls the length of time the spray guns operate. The spindle and guns operate at the touch of a foot pedal, but stop automatically as predetermined by the dial settings.

The speed of operation is dependent upon the required loading time, which in turn is controlled by the nature of the piece being sprayed and by whether masking devices are employed.

Provision is made for mounting up to four guns, one in each corner as required to cover the work. A workholder is designed to serve also as a masking device when masking is required. Provision has been made for automatic oiling of the driving motor. *Conforming Matrix Corp.*

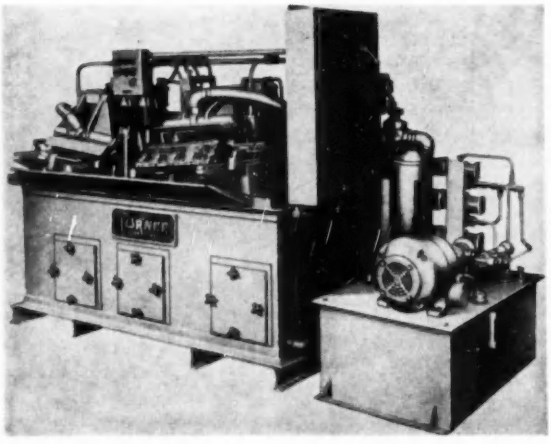
Circle E-6 on page 81 for more data



Conforming painting machine.

Flush-Out Machine for Semi-Machined Cylinder Heads

A multiple cylinder head flush-out machine for testing and washing sand and chips from semi - machined cylinder heads has been designed. The cylinder head is placed in one side of the machine, tripping limit switches. Water pressure is automatically applied to fixture and forced into all unsealed openings in the cylinder head. (Turner Bros., Inc.)



Circle E-7 on page 81 for more data

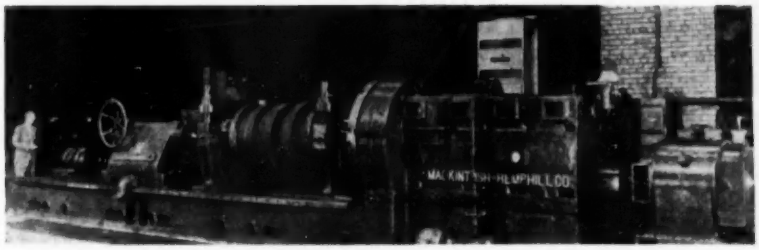
Heavy-Duty Automatic Contour Lathe

Now available is an electronically-controlled 60-in. heavy-duty automatic contour turning lathe. Designed to operate at high speeds, it uses tungsten-carbide tools.

Contour duplication is achieved by combined action of a cross-feed motor and a longitudinal feed motor, both controlled by Raytheon electronics. Motors are actuated by signals from a floating stylus mounted on the carriage cross slide. Feather-light pressure of the stylus on a fixed template determines the sense of current flow to the motors and thus sets direction and speed of tool travel. Closely-controlled interaction of the two feed motors produces exact duplication of template shape on the roll body.

The lathe has an all-geared, totally-enclosed headstock, a three-way extra wide bed, two steady rests or roll housings, carriage with electronically controlled longitudinal and cross feed, and live-center tailstock.

Headstock face plate is a steel casting with two sets of "T" slots. Parallel double slots are for heavy-duty chuck jaws. Between each pair of parallel slots, radial slots are provided for special driving dogs. Face plate ring gear is driven by a double-helical pinion with outboard bearings.



Mackintosh-Hemphill contouring lathe.

Roll housings are fitted with Babbitt-lined bronze bearings which can be adjusted radially, through screw-operated wedges, to suit neck diameter and longitudinally to contact thrust faces at ends of roll body. The housings will accommodate neck diameters from 11 to 28 in.

Tailstock is a special housing fitted with an oversize steel spindle. The spindle is operated by a worm and worm wheel; the worm wheel is internally threaded and mounted on the spindle. An antifriction-bearing live center has a taper fit to suit the spindle. Lateral movement of the tailstock assembly is effected by pinion and rack mounted on the bed.

The carriage has extra long wings which bear on the bed for their entire length. Carriage, riding on the front and middle way, is so designed that it will pass both tail stock and roll housings. *Mackintosh-Hemphill Co.*

Circle E-8 on page 81 for more data

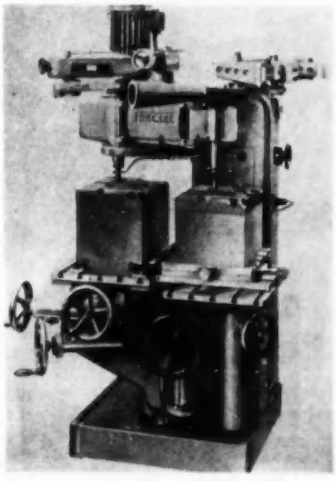
Die Sinking Machine

The Deckel Model KF12 universal pantograph die sinking machine is claimed to perform an extremely wide range of copy milling operations from die sinking of large dies and molds to light engraving. The pantograph system permits two- or three-dimensional milling at 1 to 1 ratio and reductions or enlargements from 1 to 1.5 to 1 to 4.

Cutting area and working capacity of these machines has been increased —in a single set-up, the cutting tool will cover an area of 15¾ in. by 15¾ in. or 10 in. by 19¾ in. These cutting areas can be utilized with die blocks up to 15¾ in. in height.

The power-operated vertical saddle permits both the master and workpiece to be raised or lowered simultaneously at a rate of 30 ipm. The rough milling spindle has a built-in speed reducer and will hold collets for chucking tools with No. 2 Morse Taper or straight shanks up to ¾ in. diam. Infinitely variable spindle speeds range from 60 to 10,000 rpm.

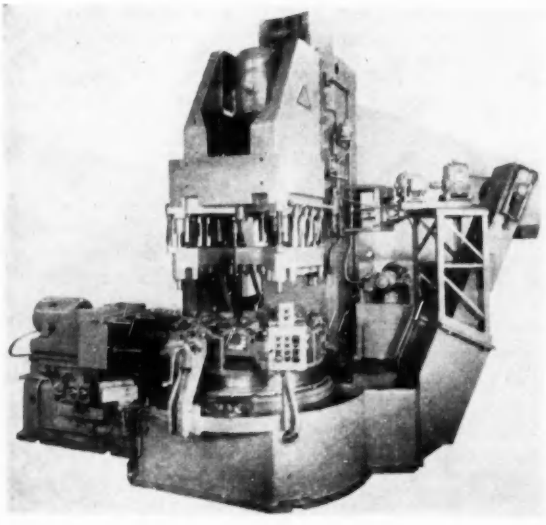
The improved circular forming attachment, which is readily mounted on the tool slide, allows circular forming operations in both vertical and horizontal planes and on inclined surfaces. *Cosa Corp.*



Cosa distributed die sinking machine.

Circle E-9 on page 81 for more data

Two-Way Drilling and Reaming Machine



For the machining of tractor track links, a special two-way drilling and reaming machine has been developed and placed on the market. It is a four station, automatic indexing type. Production capacity is approximately 45 pieces per hour at 100 per cent efficiency. (LeMaine Tool & Manufacturing Co.)

Circle E-10 on page 81 for more data

(*Turn to page 78, please*)

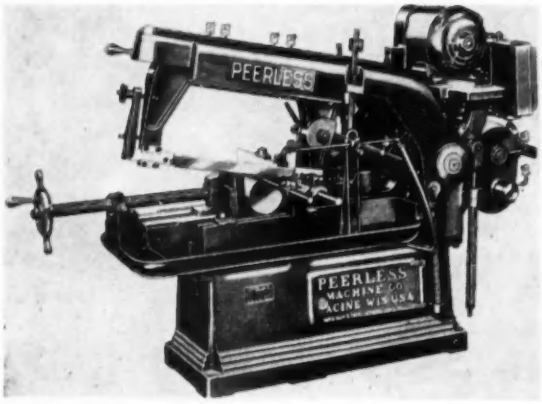
NEW EQUIPMENT — PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 81

(Continued from page 77)

Metal Cutting Saw

A 10 in. by 10 in. standard model metal cutting saw has been brought out to replace the 9 in. by 9 in. standard formerly in production. The 10 in. by 10 in. is an overarm type with an open saw frame to permit loading from front or side for the general purpose work it is designed to handle. The overarm is much heavier than that of the tool it replaces and it carries and guides the saw frame. Another feature of the saw is the heavy U-type saw frame. In addition to its heavier construction, this frame has wider shoulders than its predecessor. The frame also has replaceable, hardened and ground steel bearing shoes. (Peerless Machine Co.)



Circle E-11 on page 81 for more data

Horizontal Comparator for Inside and Outside Dimensions

Federal horizontal comparator.

Now available is a horizontal comparator which is claimed to provide high-precision dimensional comparison. All amplification is accomplished by an electronic circuit.

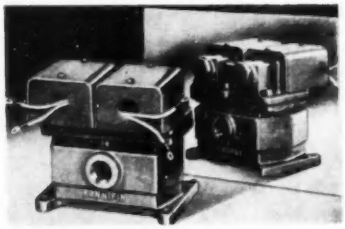
One of the features of the instrument is that a constant pressure is applied to the sides of the workpiece by each contact at every point of measurement. This pressure is exactly the same for every part inspected. Design of the mechanism that makes this possible was one of the basic objectives in designing the comparator.

Magnification selection ranges from 500 to 1 up to 15,000 to 1 with two intermediate increments. Gaging pressure is eight oz for either inside or outside use. *Federal Products Co.*

Circle E-12 on page 81 for more data

Air Control Valve

A special air control valve has been designed which, the manufacturer asserts, makes practically impossible "repeats" due to valve failure on mechanical presses controlled by air-operated clutches and brakes. The valve, latest to be announced in the firm's P-M line of "Pilot-Master" valves, is a dual three-way valve—two three-way valves in parallel in one, common body. Both valves must operate to start the press, but if for any reason only one valve reverses,



Hannifin air control valve..

the unit fails safe and the press stops. The valve is called the P-M Series BB-5 and is offered only in ¾ in. I.P.S.

The two solenoids in this dual valve are connected in parallel in the electric circuit of the press. Two pilot sections are interlocked pneumatically so that, if either solenoid fails to operate, the valve will not build up enough pilot pressure to operate either main valve and the press will not start. On the other hand, with the press moving, if either solenoid or either pilot valve reverses, pilot pressure will fall so low on both sides that both main valves will reverse and the press will stop. *Hannifin Corp.*

Circle E-13 on page 81 for more data

Phosphatizing Material

Recently announced is CrysCoat HC phosphatizing material for creating a complex zinc phosphate coating on steel and iron to aid adhesion of paint to metal. The coating is crystalline in nature and has a weight ranging from 200 to 1200 mg per sq ft.

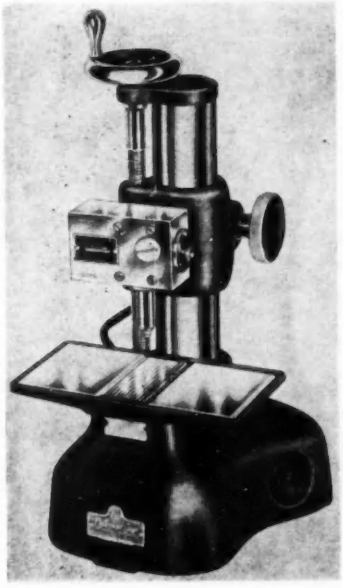
The product may be used in tanks and in pressure-spray washing machines. Sludging and scaling are said to be held to the absolute minimum. *Oakite Products, Inc.*

Circle E-14 on page 81 for more data

Comparator

The universal Electrolimit circuit and gage block comparator stand combined with the recently developed electronic recorder have been developed to provide an instrument with 110,000 to 1 magnification.

The 11 in. scale of the recorder is equal to only 0.0001, with each primary division equal to 0.000005, and secondary divisions equal to 0.000001.



P&W Electrolimit millionth comparator.

The electronic recorder is provided with a pen lifter and chart drive switch so that under normal operation it is used as an indicating instrument. However, by using the switch the chart carriage is started and the measurements are actually recorded on the chart paper. *Pratt & Whitney, Div. Niles-Bement-Pond Co.*

Circle E-15 on page 81 for more data

Detroit Loadmeter.

Tool Wear Meter

A device for controlling wear and limiting breakage of carbide tools has been put on the market. Termed the "Loadmeter" this instrument works on the ammeter principle to indicate motor capacity and percentage overloads, but is said to incorporate features not available in an ordinary ammeter.

First, the Loadmeter is constructed with an auxiliary red pointer which can be set by the operator or by supervision at the point at which a tool is dull and should be changed. It can be set for any motor ranging from 1 to 50 hp and the entire dial is then focused to that specific motor. At any time it can be sent back to the manufacturer for change to a motor of a different rating at a nominal charge.

An easy-to-read colored dial registers green when the machine is operating from zero to 100 per cent of rated motor capacity, yellow from 100 to 125 per cent, pink from 125 to 150 per cent and red above 150 per cent. *Detroit Milling Cutter Co.*

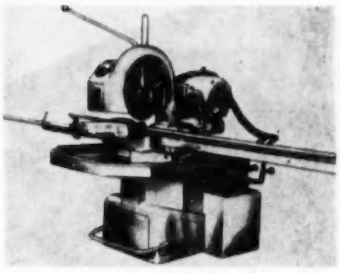
Circle E-16 on page 81 for more data

Cut-Off Machine

A recently developed line of cut-off machines are said to be a completely different application of normal, wet-cutting—bonded abrasive wheel cutters. In this machine, a segment of the cutting wheel is encased in a removable housing which contains integrally casts radial vanes. Coolant is supplied to each half of the housing guard. Rotation of the abrasive wheel builds up a water pressure between the faces of both wheel and guard.

The abrasive wheel is supported and driven by a hollow main shaft. Within this mainshaft is an eccentric fitting and a smaller internal shaft which drives the eccentric mechanism. *Ballinger Div Douglas Export-Import Corp.*

Circle E-18 on page 81 for more data



Ballinger cut-off machine.

Electronic Core Baking Equipment

Conveyorized, variable speed electronic core baking equipment has been designed and made available to the trade. These high frequency machines are claimed to speed up baking cycles, reduce rejects and generally improve core quality.

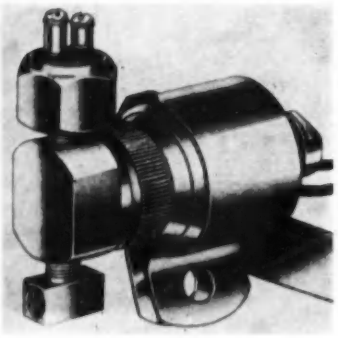
This core baking equipment consists of a variable speed conveyor system, entrance shielding vestibule, a high frequency electrode system and enclosure, exit shielding vestibule, a high frequency oscillator section, and a power supply section. The heating section contains an exhaust blower to remove fumes and moisture. *Thermex Div., Girdler Corp.*

Circle E-17 on page 81 for more data

Thermex core baking unit, Model 15CC.

NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81



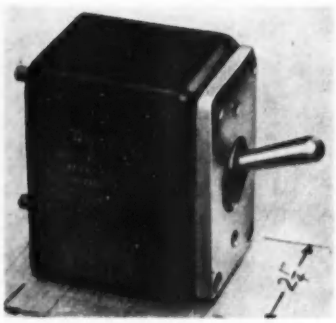
Safety Device to Prevent Vehicle Roll-Back

Recently announced is an electric-type safety device which is said to prevent roll-back or creep when a vehicle stops on a hill or grade. Known as NoRol, it works automatically with the application of the brakes. By keeping the brakes applied, it holds car firmly stopped on upgrades and also prevents cars equipped with automatic transmissions from creeping forward at stops.

The unit reportedly relieves drivers of the necessity of keeping a foot on the brake pedal after a vehicle is halted. Brakes are automatically released when the accelerator is touched to permit a smooth start.

The device fits all makes and models of cars with hydraulic brakes and a six-v electrical system. It is claimed that the unit operates only when the vehicle has been brought to a stop, and is automatically released when accelerator is used. *Automotive Div., Wagner Electric Corp.*

Circle P-5 on page 81 for more data



Heavy-Duty Waterproof Toggle Switch

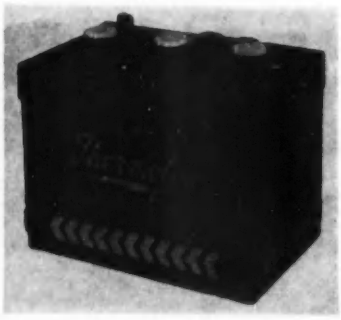
Recently added to a line of waterproofed switches is a heavy-duty model that is said to function well from —65 F to 165 F. It also withstands shock, vibration and salt spray, according to the manufacturer.

Continuous rating of the switch is 175 amp at 15 or 30 dc or 125-v ac. Maximum inrush capacity on any type of load is 500 amp. Toggle and pole arrangement is for spst.

The switch can also be wired in multiple as dpst, and will be available shortly in a spdt arrangement as well. Overall dimensions are 2¼ in. by 2⅝ in. by 3½ in., with the toggle extending 1 7/16 in. beyond the mounting plate at the top of its travel. Weight is about 1½ lb.

Although developed primarily for ordnance use, the switch is suitable for other applications. *Riverside Manufacturing & Electrical Supply Co.*

Circle P-6 on page 81 for more data



Long-Life Battery for Passenger Cars

Recently introduced for passenger car installation is a battery that reportedly can be guaranteed for the life of the owner's car. Known as Thermoloy, it will be priced in the premium class.

A patented method of battery construction stimulates flow and circulation of acid to promote cooler operation. The introduction of selenium into the battery fluid is said to boost battery effectiveness beyond normal expectancy. It produces a bonding agent which acts upon the positive plate to halt or slow up normal corrosion.

In addition to cars, the batteries are made for trucks, farm equipment, Diesel engines, marine engines, and all types of industrial requirements. *United Battery Co., Inc.*

Circle P-7 on page 81 for more data

Anti-Skid Stabilizer for Automobiles

Now on the market is an automobile anti-skid device designed to minimize dangerous and sudden car swerves. Known as Kar-Stat, it consists of a balanced floating weight on spring-loaded, chrome-alloy steel bearings.

The unit is mounted on back of the rear frame cross-member of the car. As long as the car moves in a straight line the floating weight remains in a "neutral" position. When the car skids or sways, the force set up by the car is offset by the opposing

(*Turn to page* 122, *please*)

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FREE LITERATURE

Engine Data

Recently released is a bulletin (S-500-B55) entitled "New Developments in Oil Diesel, Dual Fuel Diesel, and High Compression Spark Ignition Engines." Illustrations are included. *Engine Div., Worthington Corp.*

Circle L-1 on postcard for free copy

Broaching Practice

Recently published is an 80-page book entitled "Broaching Practice." It contains a wealth of data for the production engineer and shop man. Copies are available on request to key personnel only in metalworking plants. *National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.*

Steel Shaping Process

Now available is a 28-page product design guide on new commercial applications for the manufacturer's Steel Koldflo process. The latter is a process for cold shaping steel by displacing metal under compression. *Mullins Manufacturing Corp.*

Circle L-2 on postcard for free copy

Regulators—Changers

Catalog No. 353 contains data on a line of electronic a-c line voltage regulators. It also gives descriptions and specifications for electronic frequency changers. *Sorensen & Co., Inc.*

Circle L-3 on postcard for free copy

Molecular Bonding

Now ready is a booklet on a process for the molecular bonding of aluminum and its alloys to steel, iron, and other metals. *Al-Fin Div., Fairchild Engine & Airplane Corp.*

Circle L-4 on postcard for free copy

Carbon Steel Bars

Recently released is an eight-page bulletin which serves as a guide to the selection, use, and relative cost of cold finished carbon steel bars. *Joseph T. Ryerson & Son, Inc.*

Circle L-5 on postcard for free copy

Electrode Holder

Recently released is a brochure on the Micro-Metric upper electrode holder. Its function is diagramatically illustrated. *Sciaky Bros., Inc.*

Circle L-6 on postcard for free copy

Testing Facilities

Fresh off the press is a booklet on methods and equipment for non-destructive testing. *Magnaflux Corp.*

Circle L-7 on postcard for free copy

Molded Nylon Parts

Fresh off the press is a folder on molded nylon parts for various uses. *Chemical Div., General Electric Co.*

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(Please turn page)

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L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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Piezo-Electric Materials

Now available is a 24-page brochure describing the science of Piezotronics. Supplementing it is a 32-page technical data booklet on the general properties of piezo-electric materials, their basic behavior, and electronic circuit applications. *Brush Electronics Co.*

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Production Facilities

Bulletin 00-125 describes the manufacturer's varied products, services, and facilities for mechanical, hydraulic, and electrical work. *Sperry Products, Inc.*

Circle L-10 on postcard for free copy

Air-Turbine Drives

Recently made available is a bulletin on a series of air-turbine drives for several power applications. *Stratos Div., Fairchild Engine & Airplane Corp.*

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Selectors—Relays

Bulletin 353 CSR contains engineering data on Ledex circuit selectors and stepping relays. Complete specifications are given. *G. H. Leland, Inc.*

Circle L-12 on postcard for free copy

Resin Products

Ready for distribution are two booklets, one on Teflon tape for electrical insulation, and the other on various Teflon products. *Raybestos-Manhattan, Inc.*

Circle L-13 on postcard for free copy

USE THIS POSTCARD

Rust Prevention

Now available is a 16-page booklet which explains in detail the composition and uses of rust preventive coatings. *Rust-Oleum Corp.*

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Machine Tools

Newly published is a 180-page catalog of both U. S. and European machine tools and accessories for turret lathes. Requests should be made on company letterheads. *Morey Machinery Co., 410 Broome St., New York 13, N. Y.*

Press Brakes

Catalog B-4 on press brakes has recently been released. It covers press brake applications and describes the manufacturer's line. *The Cincinnati Shaper Co.*

Circle L-15 on postcard for free copy

Taps and Screw Threads

Recently released is a handy booklet containing information on taps and the latest unified and American screw threads. *Threadwell Tap & Die Co.*

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Aircraft Services

Recently released is a 16-page manual on the manufacturer's technical service to, and products for, the aircraft industry. *E. F. Houghton & Co.*

Circle L-17 on postcard for free copy

Plastic Coating

Recently announced is a brochure on Dip-Pak hot-melt plastic coating for a broad range of products. *Fidelity Chemical Products Corp.*

Circle L-18 on postcard for free copy

Boring Machines

Bulletin 31205 covers a line of standard precision boring machines. Complete specifications are given. *Ex-Cell-O Corp.*

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Steel Castings

Now available is a 16-page manual with extensive data on steel castings as an engineering material. *Steel Founders' Society of America.*

Circle L-20 on postcard for free copy

Bonded Parts

Recently released is a brochure on rubber-to-metal bonded parts for many uses. *Acushnet Process Co.*

Circle L-21 on postcard for free copy

Furnace Loader

Now ready is a booklet on the Man-O-Steel heat treat furnace loader. *Michigan Crane & Conveyor Co.*

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L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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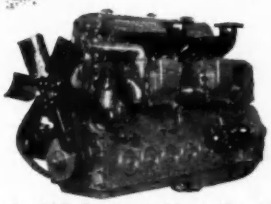
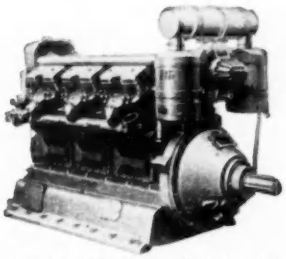
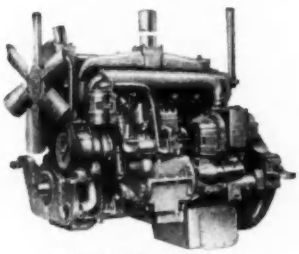


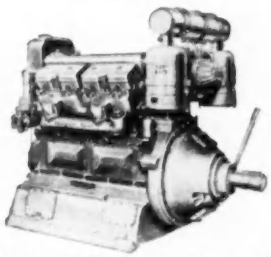
Model 687-C—Harnischfeger Corporation 6 cylinder, 2 cycle using two S-C superchargers.



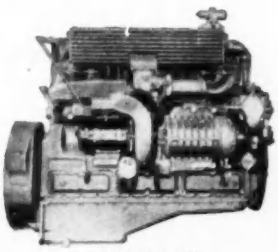
Model D-397—Caterpillar Industrial Diesel V-12.



Model D-337—6 cylinder—Caterpillar Diesel.



Model D-375—Caterpillar Diesel V8.



Model HRBS-600
Cummins Engine Company, Inc.
(Used also on HBS Series)

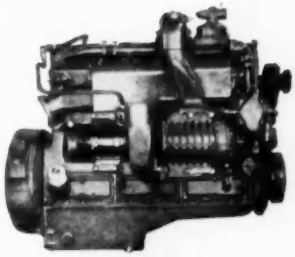
More than twenty-five years of research, intensive engineering, wide field experience and unexcelled manufacturing facilities are back of our product.

Its excellent service record in tens of thousands of applications under the most severe operating conditions has established Schwitzer-Cummins superchargers as a product of supreme reliability and efficiency.

We build superchargers for trucks, busses, earth-moving equipment, power plants, submarines, in fact for all uses up to 800 hp.

We can offer the last word in engineering assistance and the ability to produce efficiently.

Model 487-C—Harnischfeger Corporation
4 cylinder, 2 cycle.



Model NHRBS-600
Cummins Engine Company, Inc.
(Used also on NHS-NHBS-NHBRS.)

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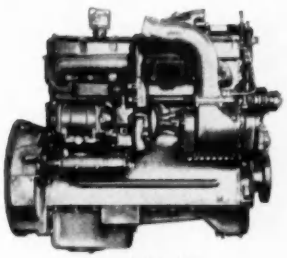

Model JBS-600
Cummins Engine Company, Inc.
New High Speed Engine.

POSITIVE DISPLACEMENT SUPERCHARGERS and EXHAUST DRIVEN TURBOCHARGERS

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NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

Mass Flowmeter

Recently announced is a midget electronic instrument, weighing less than eight lb, which is said to measure actual fuel consumption in lb-per-hr readings. It shows the pilot his rate of fuel consumption regardless of such factors as pressure, velocity, humidity, viscosity and temperature.

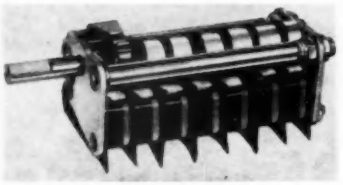
Sensing element housing and roto-mount of Gavco mass flowmeter.

The instrument is made up of packaged, plug-in assemblies that are said to be completely moisture and shockproof. The system consists of a sensing unit fitted into the fuel line that first measures the flow in gallons. A density detector simultaneously weighs samples of the fuel as it passes through.

The information from both these devices is continuously fed to an electronic integrator that compensates the flow for the true weight of the fluid and sends pulses to a dial indicator. Pilots and flight engineers read their rate of fuel consumption in lb-per-hr directly from the dial indicator.

Interchangeability with standard laboratory and industrial equipment has been designed into the product for this purpose. Each unit of the system can be used independently, in conjunction with each other, or with standard recording, control and indicating instruments. *Gavco Corp.*

Circle P-1 on page 81 for more data



Micro 7AS71 switch assembly.

Switch Assembly

Now available is a series of small-size multiple rotary switch assemblies, of which one is a ganged assembly of seven V3-type basic switches with single-pole, double-throw contact arrangement. Each V3 basic switch measures only 13/32 by ⅝ by 1 3/32 in., and the entire assembly measures 1½ by 1⅝ by 4¾ in.

In its initial use as an aircraft cockpit lighting control of multiple circuits this assembly, identified as catalogue listing 7AS71, has reportedly been found to have excellent resistance to vibration. The pivoted cam followers accurately maintain their adjustment. Cam combinations can be used to give any desired sequence of circuit control or switching arrangement, according to the manufacturer.

The d-c rating of the 7AS71 assembly for inductive and heater load is: 30 v, 10 amp, at sea level; 30 v, six amp at 50,000 ft altitude. The a-c rating for inductive and heater load is: 125 or 250 v, 10 amp. Current ratings are based on a maximum permissible temperature rise of 65 C. Inductive load ratings were determined by using AN3179 inductors.

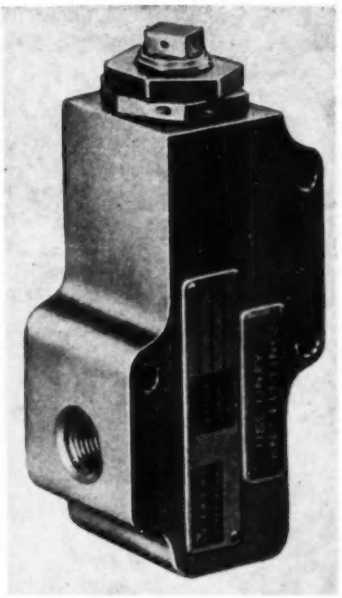
Other variations of the 7AS71 assembly are available in from three to eight gang assemblies of V3-type basic switches and from two to eight switching positions at 45-deg angular rotation between positions. *Micro Div., Minneapolis-Honeywell Regulator Co.*

Circle P-2 on page 81 for more data

Relief Valves

Recently announced are AA-31300 Series valves with rated capacities of two, five, and 9 gpm. A 16-gpm size (max. 24 gpm) is also available. The same internal parts are available in a four-port housing for each valve size. The basic valves can be provided with a vent feature to permit outside control. *Vickers, Inc.*

Circle P-3 on page 81 for more data

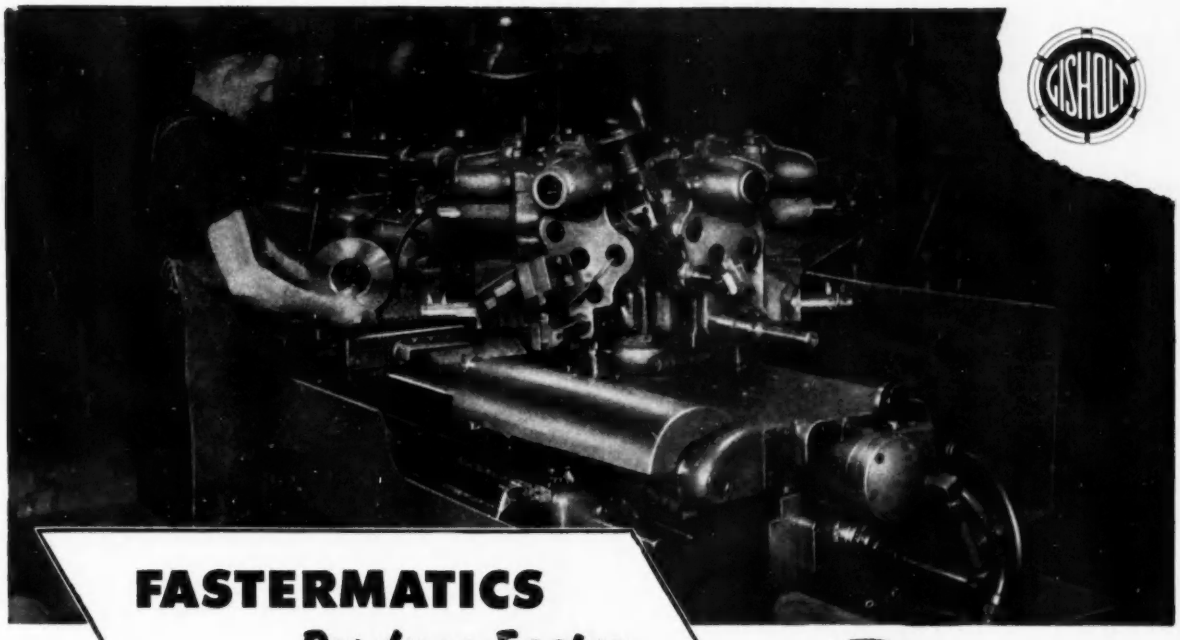


Vickers Model AA-31304H relief valve.

Jet Engine Lubricant

Now available is an all synthetic jet engine lubricant which meets the requirements of Spec. Mil. L-7808. The product is said to be excellent for lubricating bearings and gears at high speeds and under high loads. Resistance to decomposition and formation of coke-like deposits is reportedly very good. *Standard Oil Development Co.*

Circle P-4 on page 81 for more data



FASTERMATICS
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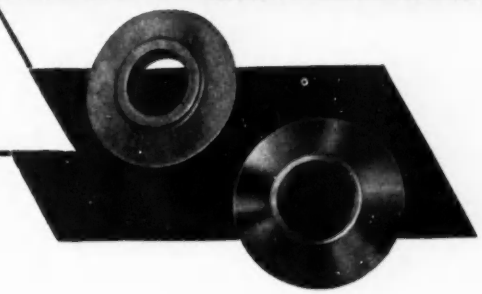
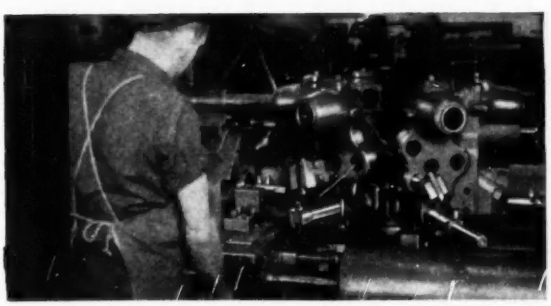


It may seem incredible, in this day and age, for any major machine tool to "buy" itself in nine short weeks of operation. But that's exactly what the Fastermatic Automatic Turret Lathe did on this job of machining clutch plate hubs.

Former time, on hand-operated turret lathes, was 15 minutes per piece. The Fastermatic, with automatic control of all machine functions, reduced the time to only 3 minutes, floor to floor.

Earnings piled up so fast over former production costs that the Fastermatic paid for itself in just 9 weeks—or 893 hours of operation.

Do you have work that permits a number of cuts in one chucking? Investigate the Fastermatics. You may have a big opportunity to increase production, cut costs and save man power.



In this tooling setup, only 3 turret faces are needed to turn each part. With duplicate tooling on the remaining 3 faces of the hexagon turret, 2 parts are machined with each complete turret cycle. The operator merely loads and unloads the work.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY

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TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

METALS

Lead and Tin Advance in Price. Excellent Demand for Zinc, But Profits Are Low. Aluminum Shortage Foreseen.

By William F. Boericke

No Letup in Steel Operations

Present operations of the steel industry at 100.5 per cent capacity based on an annual rate of 117.5 million ingot tons has surprised even the most ardent optimists in the trade. Considered opinion when 1953 was in swaddling clothes was that before the second half of the year there would be plenty of evidence of a cutback in operations. To date, nothing of the kind has appeared. Demand for steel is torrid. Steel supplies remain tight. Almost all producers now agree that capacity operations will continue through the third quarter. There's a little uncertainty over the fourth quarter. U. S. Steel's president admits the possibility of some relaxing in the last months of the year, and Armco officials hedge a little more and look for 90 per cent capacity operations. Others see no change. One producer declared he had more business on his books for the third quarter than he could possibly fill.

Some minor increases in steel price have been made, but aside from increases in steel rails, they were confined to extra charges added to the base price to cover costs of special processing for customers. These increases had been generally expected and occasioned no resentment from users. Base prices probably will hold at present levels for the time being, until more is known of the outcome of the industry's wage negotiations with C.I.O.-United Steel Workers.

Steel Strike Is Unlikely

The chances are against a steel strike, but the possibility exists. Most steel executives declare that another pay increase is unjustified. But others think that a "token" settlement of a small amount would satisfy union leaders and save face. Only one thing seems assured. If a wage increase is granted, steel prices will be advanced in ratio.

Biggest factor in steel demand today is the automobile industry. Detroit continues to ask for more steel than can be supplied. No let-up is in sight for cold rolled sheet, large bars, plates, and structurals, but some softness has appeared in demand for some wire products and delivery from warehouses is prompt.

Weakness in Steel Scrap

Some nervousness is felt over the continued decline in the price of steel scrap. The composite price declined nearly $5 per ton in April and *Iron Age* quoted $38.83 per gross ton May 6. Dealers in scrap are unhappy. Scrap inventories are large and some mills are not in the market at all. In other years, the demand for scrap has been a pretty good barometer for the steel industry and a falling demand has forecast a future decline in the rate of steel ingot production.

On the other hand, conversion deals for steel are plentiful, an indication of high consumer demand. Such conversion deals may be costly and are quickly eliminated when there is a balance between steel demand and supply. Until conversion deals go out of the window, steel executives are inclined to discount the rather bearish implication of depressed prices for scrap.

Copper Price May Sag

During May, the domestic price per lb for copper held close to 30 cents delivered basis. This surprised the trade which had confidently anticipated a somewhat lower price. There was considerable reason to expect it, for tremendous offerings of scrap has forced the custom smelters steadily to reduce their bid to as low as 22½ cents per lb for No. 1 scrap. Allowing about 3-4 cents per lb as conversion cost to electrolytic would indicate a price of 25-26 cents for refined metal.

The catch is that it would require about 90 days to process the scrap before it could be offered on the market in competition with electrolytic copper. This would advance the time to July or August, normally a slack period with the brass and copper fabricators who would probably taper off their buying while vacations were in progress.

A great deal of uncertainty prevails in the copper trade over the future price for copper and only the bravest optimists forecast that the present 30 cent level will hold. The Chilean government holds stubbornly for its 36½ cent delivered price although African and Rhodesian metal is freely available six cents below its asking price. Strangely enough, it has been taken at the higher price by fabricators who are still pricing their products on the basis of 32.6 cents per lb, using the old 60-40 allocation of O.P.S., and in the middle of May it was reliably reported that there were no unsold stocks in Chilean ports.

Best opinion in the trade now is that Chile must reduce its price to the world level speedily if it is to

(*Turn to page* 100, *please*)

STERLING'S NEW

CONFORMATIC*

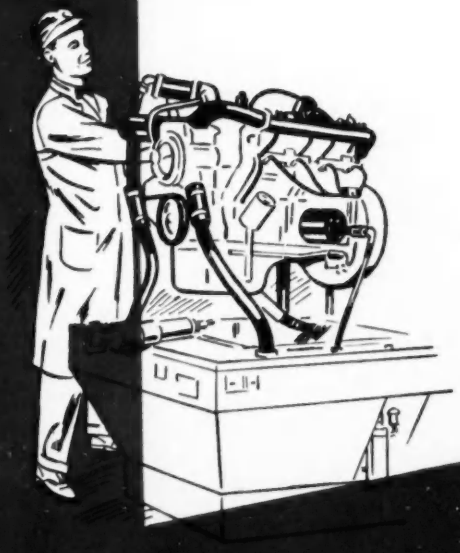
PISTON

THIS STEEL TENSION MEMBER
Maintains fitting clearance from —20° F. to 200° F.

Can Be Safely Fitted to *LESS* Clearance ... Without Danger of Scuffing or Seizing

You get quieter engines, eliminate cold slap and reduce friction ... without sacrificing piston strength or conductivity. No cold slap at temperatures as low as —20° F.... no seizing or scuffing at 200° F.

LOOK AT THESE TEST RESULTS . . .



RESULTS OF 1200 Hour CYCLE TEST

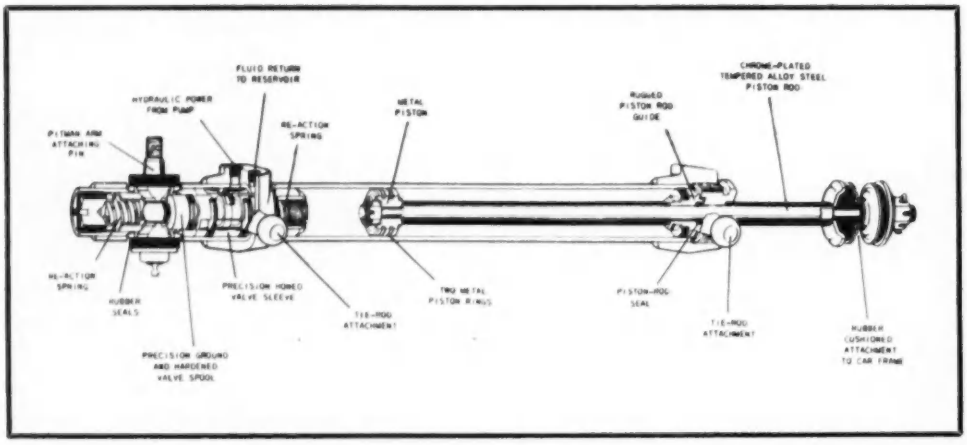
In recent cycle tests made by one of the largest automotive manufacturers, Sterling *Conformatic* pistons were fitted into a stock engine at .0005 clearance. After operating the engine for 1200 hours, approximately half of that time at full load and full throttle, *the Conformatic Pistons were pronounced perfect.*

STERLING
PISTONS

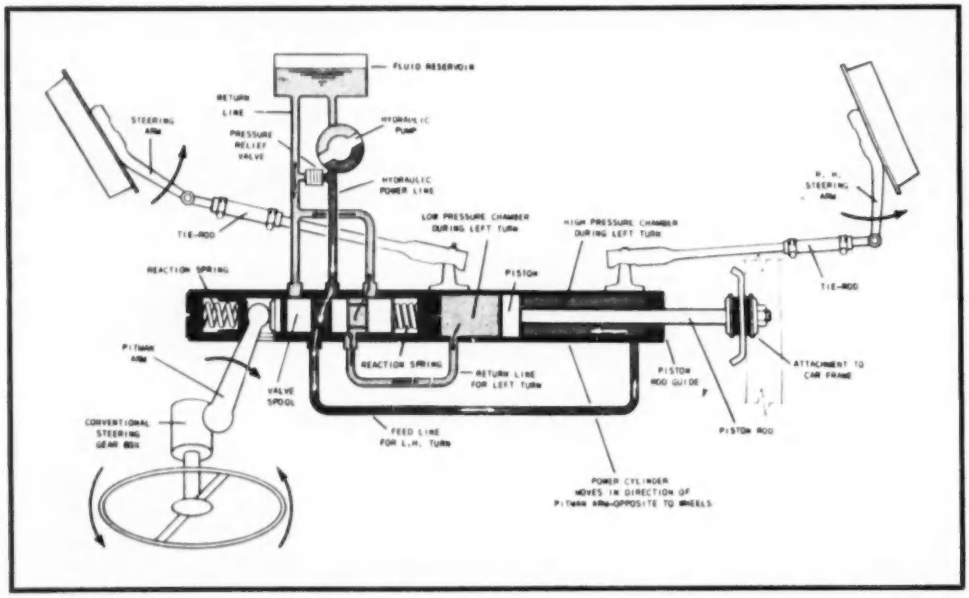
STERLING ALUMINUM PRODUCTS, INC. • St. Louis, Missouri

Details of the Monroe Power Steering Unit

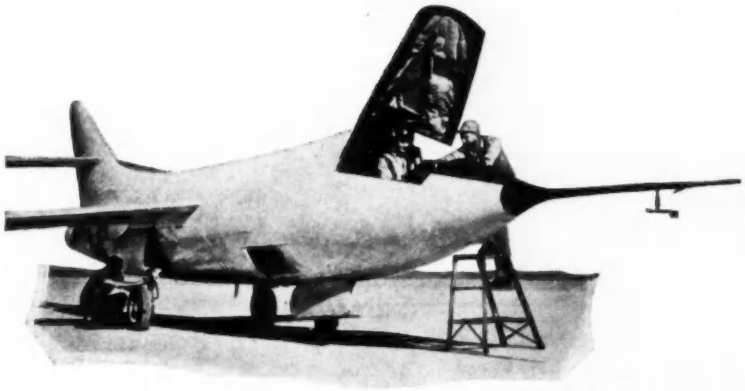
CONSTRUCTION and operation of the Monroe direct action hydraulic power steering unit are shown in the two views presented here. This new device was described and illustrated on page 47 in the March 1, 1953, issue of AUTOMOTIVE INDUSTRIES. According to a recent announcement, Monroe Auto Equipment Co. already has contracts to supply several leading automotive manufacturers with its new product.



Cutaway view of the unit showing construction of the piston, piston rod guide, valve spool, seals, etc.



This schematic illustration indicates arrangement of parts in the system, and flow of hydraulic fluid when making a left turn. The fluid pattern reverses for a right turn.

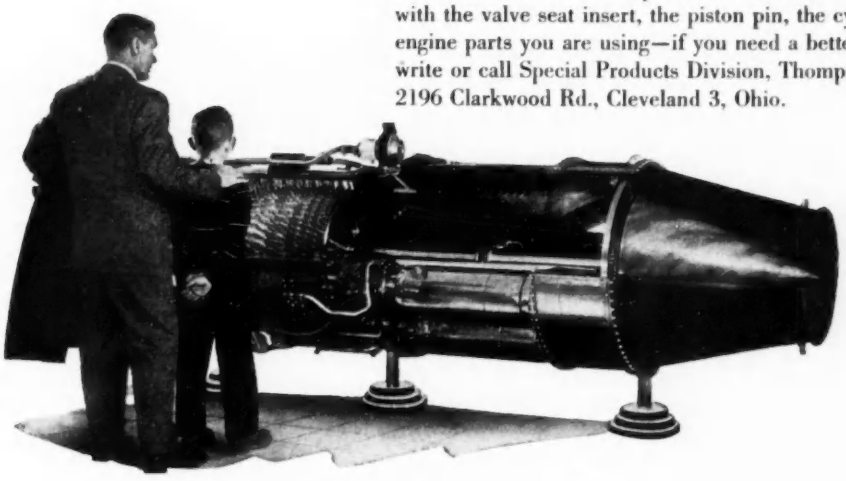


Ever since the Wright brothers first left the ground 50 years ago, Thompson Products has been part and parcel of the aviation industry, striving always to make manufacturing more precise and cheaper—to discover new ways to use new metals, to introduce new processes. Today, Thompson makes parts and accessories for virtually every plane that flies, every vehicle on farm, rail and highway.

Performance you can take for granted!

Modern mass production depends on a constant flow of component parts. Parts that are once specified can be forgotten. The same research, metallurgical knowledge, precision manufacturing and testing that go into highly specialized jet and defense parts is back of every part made by Thompson's Special Products Division.

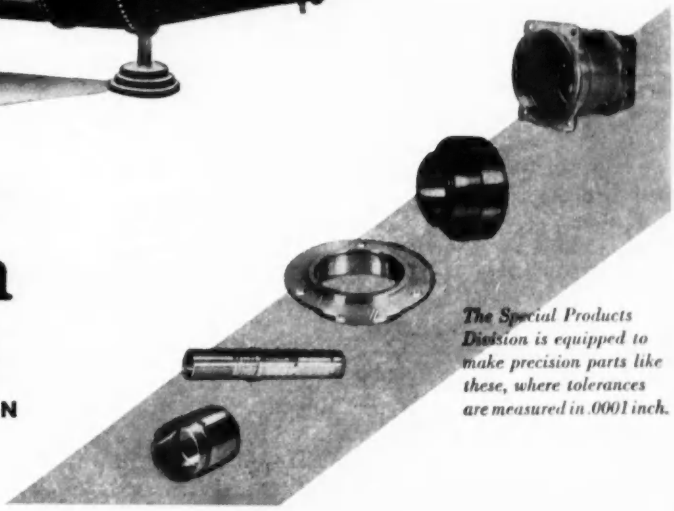
You can count on Thompson for dependability of supply, quality, exact tolerances and maximum performance and service. If you are having trouble with the valve seat insert, the piston pin, the cylinder sleeve or other engine parts you are using—if you need a better, more dependable supplier, write or call Special Products Division, Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland 3, Ohio.



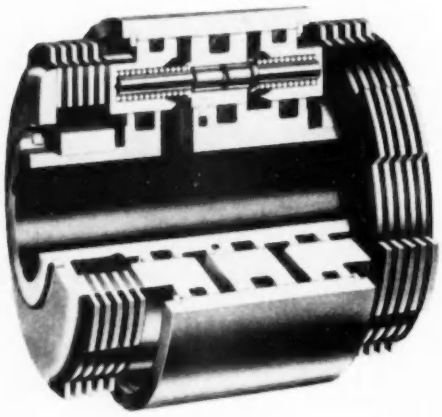
You can count on

Thompson Products

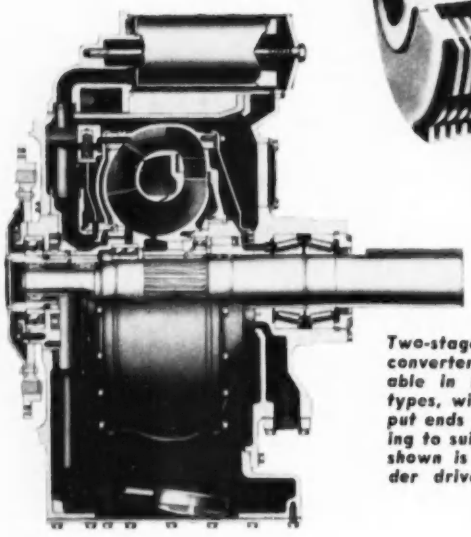
SPECIAL PRODUCTS DIVISION



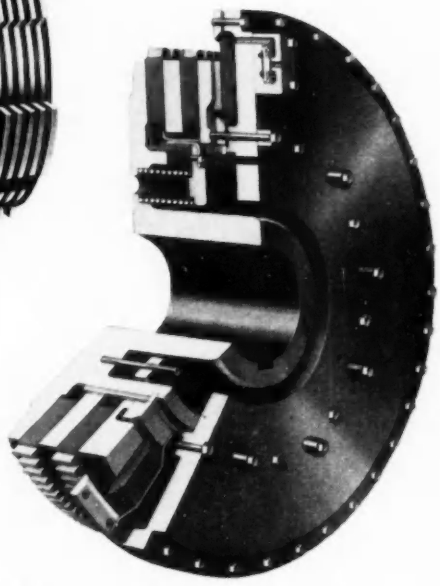
The Special Products Division is equipped to make precision parts like these, where tolerances are measured in .0001 inch.



Multiple plate clutch, Model MOD (duplex). It is designed for high, constant torque capacity, push button control, and adaptability to remote control. This clutch is available also in Model MOS (single).



Two-stage hydraulic torque converter which will be available in industrial and truck types, with variations of output ends and of internal blading to suit specific needs. Unit shown is Model SD with spider drive and disconnecting feature.



Model PO air-actuated clutch, one of a series designed for lighter weight and higher torque capacity, together with narrower clutch width.

New Industrial Drives

FIVE new industrial drives have been developed by the Twin Disc Clutch Co. of Racine, Wisc. and Rockford, Ill. These include a two-stage hydraulic torque converter, an oil-actuated multiple plate clutch, a two-speed transmission for use behind torque converters, an air-actuated clutch and a disconnecting hydraulic power take-off.

The new two-stage hydraulic torque converter was developed to fill the gap in industrial hydraulic drives, and is particularly adaptable for heavy-duty engine installations involving frequent and large load variations. It develops up to 4:1 torque multiplication at stall, combined with progressively increasing engine speed during acceleration and uniform pull-down under load.

Principal feature of the Twin Disc two-stage converter is its freewheel stator blade arrangement which provide complete unloading of the engine at high-speed, no-load conditions.

The basic two-stage converter unit is the Model S, which offers a standard spider drive input, and is equipped with a built-in converter charging pump around the input shaft—just adjacent to the drive spider. Inlet and outlet connections are provided for piping the converter fluid to and from a cooler, which can be either an oil-to-water heat exchanger or an oil-to-air radiator.

Twin Disc has also designed the new two-stage converter in a disconnecting type, called the Model SD, shown in the illustration. Essentially the same as the basic Model S unit described above, the Model SD incorporates the additional design feature of quick-release dump valves on the rotating turbine wheel, to permit release of the oil from within the converter circuit, providing a complete disconnect feature. Another feature is a two-position control valve, located on top of the stationary converter housing, for actuation of the dump valves.

The new Twin Disc oil-actuated multiple plate clutch was developed for use on machine tools, as well as many other powered-equipment installations in the industries which make and use machines. The new oil-actuated clutch was based on the type of mechanically actuated clutch upon which the industries have generally standardized, such as the Twin Disc Models MTS and MTU. The design is extremely simple, incorporating an integral oil cylinder to clamp the plate stack. Extensive use of snap rings is employed to provide easy disassembly.

(*Turn to page* 104, *please*)

Packard

One of the many leading engine manufacturers to select and distribute Perfect Circle's 2-in-1 chrome piston ring set for authorized replacement service

2-in-1 is the truly modern piston ring equipment, controls oil—seals compression for over twice as long as ordinary sets. Solid chrome protects both oil rails and top compression rings against wear. And only 2-in-1 offers a choice of spring pressures with each oil ring to meet any cylinder wear condition.

For sustained power and positive oil control for thousands of extra miles, always install Perfect Circle 2-in-1 piston ring sets. Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Toronto, Ontario.

Perfect Circle

PISTON RINGS The Standard of Comparison

Cars in Sweden Increasing

(*Continued from page* 51)

and 1952 the total share of these two sources of supply rose to the same extent as that of the United States fell. This, of course, is due to the persistent dollar shortage. The situation as depicted by these statistics, however, is not quite correct. A great number of cars of American origin enter the Swedish market via other countries—particularly Belgium, Holland, Denmark and Israel. During 1952 the number of American cars supplied in transit from these countries may be estimated at about 1000.

General Motors has been the company hardest hit by the prevailing currency difficulties. Although more than every third American-made car supplied to the Swedish market is of GM-make, the drastic decline in total imports from dollar sources has particularly affected this company. It has not been easy for them to develop alternative European sources of supply, either from Great Britain (Vauxhall) or Germany (Opel). The GM-share of British-made cars imported into Sweden during 1952 is estimated at only eight per cent. General Motors Nordiska AB employs at present little over 500 workers, and its assembly plant is operating on about the same level as prewar. Yet every fifth car on the Swedish roads is a GM-car.

Ford Motor Co. recently brought out its 150,000th car marketed in Sweden. Formerly merely a sales and service organization, in 1949 it established an assembly plant of its own. Operations are gradually expanding but still are little more than half of the plant's potential capacity. Last year Ford had 522 employes.

During the brief period of existence, operations at this plant have provided an interesting study in labor efficiency. Following the old-established principles of its founder, the Swedish plant started operations on a time-pay basis. However, in view of the widespread preference for piece rate systems in Sweden, the Swedish company, at the request of the trade unions, switched over to a piece rate system. The result was, indeed, surprising. Labor efficiency rose substantially, with the result that total production could be maintained with one-fourth less labor than before.

AB Nyköpings Automobilfabrik is a Swedish company but, like GM and Ford, a trading as well as an assembling concern. In its assembly plant, completed in 1948, 300 workers are employed in addition to about 150 persons on the office and sales staff. The potential output of the assembly plant is estimated at 10-12 cars per day.

The domestic automobile industry has its origin in the manufacture of heavy equipment, fitted particularly for Swedish conditions. This is still typical of Scania-Vabis of Södertälje, an old-timer in Swedish automobile business. The company makes buses, heavy trucks and specialized motor vehicles. In this enterprise today 2500 persons are engaged, among them 1850 production workers. The sales value of its production last year reached 130 million kronor. In addition, other makes worth 30 million were sold. The company is the distributor of the German Volkswagen.

With a widespread network of local subsidiaries and sub-contractors, Volvo of Gothenburg has endeavored to develop large-scale production in

this field. Last year its production program included 8236 cars, 6700 trucks, 852 bus chassis and 3907 tractors.

As a result of the shortage of steel, the manufacture of the small Volvo PV 444, which successfully competes with foreign-made cars, fell to 110 per week last August, but the rate of production is scheduled to rise to 300 per week this year. Total output is due to increase by 20 per cent this year. Considering the limited domestic market, exportation is of major importance to effective production. Last year the company exported cars and trucks worth 80 million kronor—or more than one-fourth of total sales value (306 million kr.). Together with its subsidiaries, Volve employs about 10,000 persons.

The postwar newcomer in the Swedish automobile industry is Svenska Aeroplan AB of Linköping. Originally and primarily an aircraft manufacturer—its main product at present is jet fighters for the Swedish Air Force—this company at the end of the war looked around for a civilian product which would fit into its production program. Quite naturally, it chose the allied field of car manufacturing.

Early in 1950 the two-stroke Saab car made its appearance on the Swedish market. It is designed so that a great deal of repair work can be done by the owner himself. Exchange engines may be obtained at a price of only $100. Ten cars are manufactured daily. Along with the Volkswagen and Volvo PV 444, Saab is one of the most popular cars on the Swedish market.

U. S. Rubber Abandons Plans for N. J. Unit

The importance attached by industry to friendly relations with communities in which they operate is aptly illustrated by the decision of U. S. Rubber Company to abandon plans for a modern research center at Emerson, N. J. The company had obtained an option on property to be used for the laboratory under the stipulation that its establishment would not arouse substantial opposition among residents of adjacent communities. The company also spent considerable effort through public meetings and personal visits acquainting residents of the area with the activities of the proposed center, the university character of the architecture contemplated, landscaping plans, and suppression of odors and noises. Nonetheless, when residents still objected, the project was dropped.

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High in the Rockies Crossing the Continental Divide.

Cost Cutting Bendix-Westinghouse Air Brakes Reduce Downtime and Repairs on Rugged Mountain Runs!

When a braking system proves itself for **safe, dependable performance and low operating costs** day after day over one of the toughest trucking routes in the country its got to be good! And that's exactly what Bendix-Westinghouse Air Brakes do on hundreds of trucks operating over Colorado's Berthoud Pass which cuts through the rugged Rocky Mountains at altitudes exceeding 11,000 feet. Here these **mighty brakes** are put to a grueling test—mile after mile of steep downgrades and sharp, tight curves that require almost constant braking application. Yet here, actual fleet records testify year after year that Bendix-Westinghouse Air Brakes pay off not only with **peak performance, positive control and utmost reliability,** but with actual hard cash savings on maintenance, parts replacement costs and reduced downtime. That's why, no matter what type trucks or busses you build and whether they're designed for operation across town or cross country, you can give your customers the most in performance and profits by specifying the **brakes proven for economy**—Bendix-Westinghouse, the world's most tried and trusted air brakes!

...means

MORE PROFITS

on any hauling job

Bendix-Westinghouse

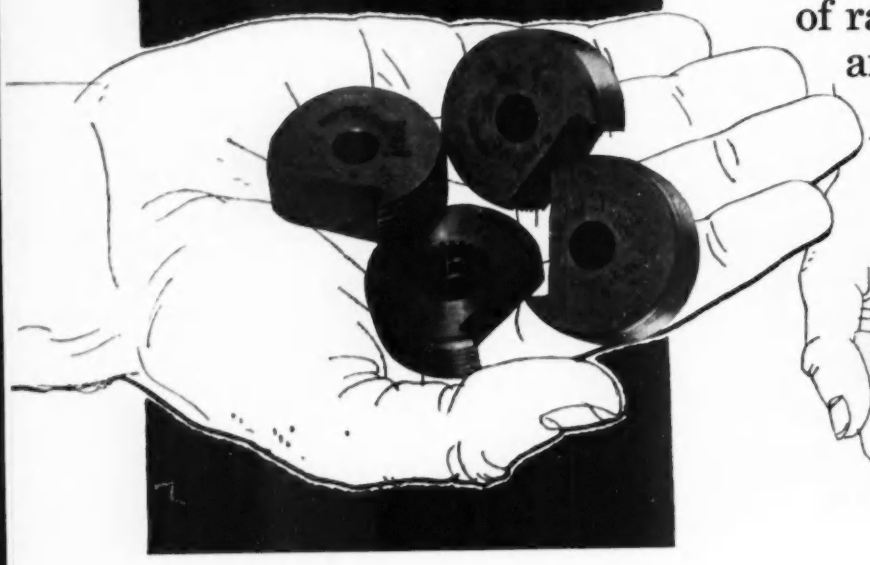
THE WORLD'S MOST TRIED AND TRUSTED

AIR BRAKES

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY • ELYRIA, OHIO • BERKELEY, CALIF.

1 SET of ground thread circular chasers cuts more threads...

than 10 SETS of radial hobbed and lapped chasers



another reason why so many production shops standardize on

VERS-O-TOOL

with GROUND THREAD CIRCULAR CHASERS

With circular ground thread chasers, you grind 200 times and up—to a full 270° of their circumference; with radial type you average 4 grinds.

With circulars, you vary the grind with the right hook and clearance to suit any material; with radials your grind is fixed, usually limited to one material, one job.

With the circular chaser Vers-o-tool System you use the patented Micrometer gauge—every regrind is identical, insuring precise uniformity of threads. You avoid adjustments, scrap loss and save time—reduce your chaser costs 10 to 1 or better, over radial chasers.

Ask for Catalog DT-52

The NATIONAL ACME CO.

170 East 131st St. • Cleveland 8, Ohio.

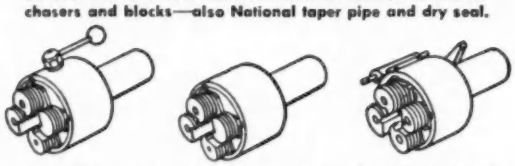
Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

CHALLENGE TO OBSOLESCENCE

By the time you've used up two sets of circulars you will have saved enough to pay for the entire Vers-o-tool installation.

The difference in life and in performance between ground thread circular chasers and the old conventional type as proved in shop after shop enables us to make this guarantee.

24-hour deliveries on most standard stockable NC and NF chasers and blocks—also National taper pipe and dry seal.



Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, 3/8"—6 1/2".

Style DR Vers-o-tool (Revolving Type) 13 Sizes 1/2"—6 1/2"

Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, 1/4"—1/2".

Ground thread circular chasers and their holding blocks are interchangeable, die size for die size, among all styles of Vers-o-tool automatic heads.

Errata

ON page 285 of the March 15, 1953 issue of *Automotive Industries* appears a table entitled "1951 Engine Production by Hp Ratings," with a breakdown for gasoline and Diesel engines. Unfortunately the data shown under Gasoline Engines are for the year 1950 instead of 1951 as the heading indicates. Correct data for 1951 are as listed in the accompanying table.

Gasoline Engines

Hp Rating	Total Engines Produced	Shipments to Other Companies: No. of Engines	Shipments to Other Companies: Value at Plant
Under 2	1,731,816	945,192	$ 22,824,000
2.0-2.9		550,383	17,904,000
3.0-3.9	146,523	90,053	5,383,000
4.0-5.9	195,004	131,914	9,624,000
6.0-6.9	7,577	1,658	337,000
7.0-10.9	125,477	80,212	8,490,000
11-35	443,469	189,949	38,380,000
36-40	262,227	22,941	5,965,000
41-50		24,949	7,198,000
51-60	55,472	42,558	12,678,000
61-70	31,871	28,356	11,063,000
71-80	40,962	32,013	14,185,000
81-90		7,653	4,547,000
91-100	19,792	15,876	4,510,000
101-150	16,494	13,497	11,321,000
151-200	3,919	1,983	3,222,000
201 and over		1,421	8,093,000
Total	3,060,603	2,180,569	$185,722,000

Under "Diesel and Semi-Diesel Engines" the value of the 11-20 Hp Rating group should be $727,000 instead of the $727,800 as shown. In the 31-40 Hp Rating group the number of engines should be 3335.

On page 284 under "Quantity by Number of Cylinders and Type of Engines," subheading "Other Engines" for 1950 the total number of engines in the 1, 2, 3, 4, 5, 6 cylinder group should be 124,971.

On page 97, the 1950 total of Truck Trailer Shipments by Months should be 65,966 with a value of $229,685,000.

New Italian Cars at Turin Automobile Show

(*Continued from page* 50)

is designed to be used with a hydraulic coupling, if desired. For the local visitors, Fiat's novelty was the 1100 model, a 66.4 cu in. car, which had been uncovered a few weeks earlier at the Geneva show.

Alfa Romeo presented the "Flying Saucer" sports car which will be put into competitions this year and which, as its name indicates, takes the form of an inverted saucer and is the most advanced type of streamlining ever seen in Europe.

De Soto Engine Plant

(*Continued from page* 55)

for feeding intake valve guides to the head, pressing them in place automatically.

Exhaust valve seat inserts are assembled in place automatically at Station 18. For this operation, inserts are fed into a Linde chilling unit which employs liquid nitrogen to lower the temperature of inserts to around minus 300 F. In this condition the inserts can be readily pushed into place, expanding to a tight fit upon reaching room temperature.

It is noteworthy that both intake and exhaust valve seats are finished to form and dimensions by generating in a precision-boring machine rather than by grinding which is the usual commercial practice.

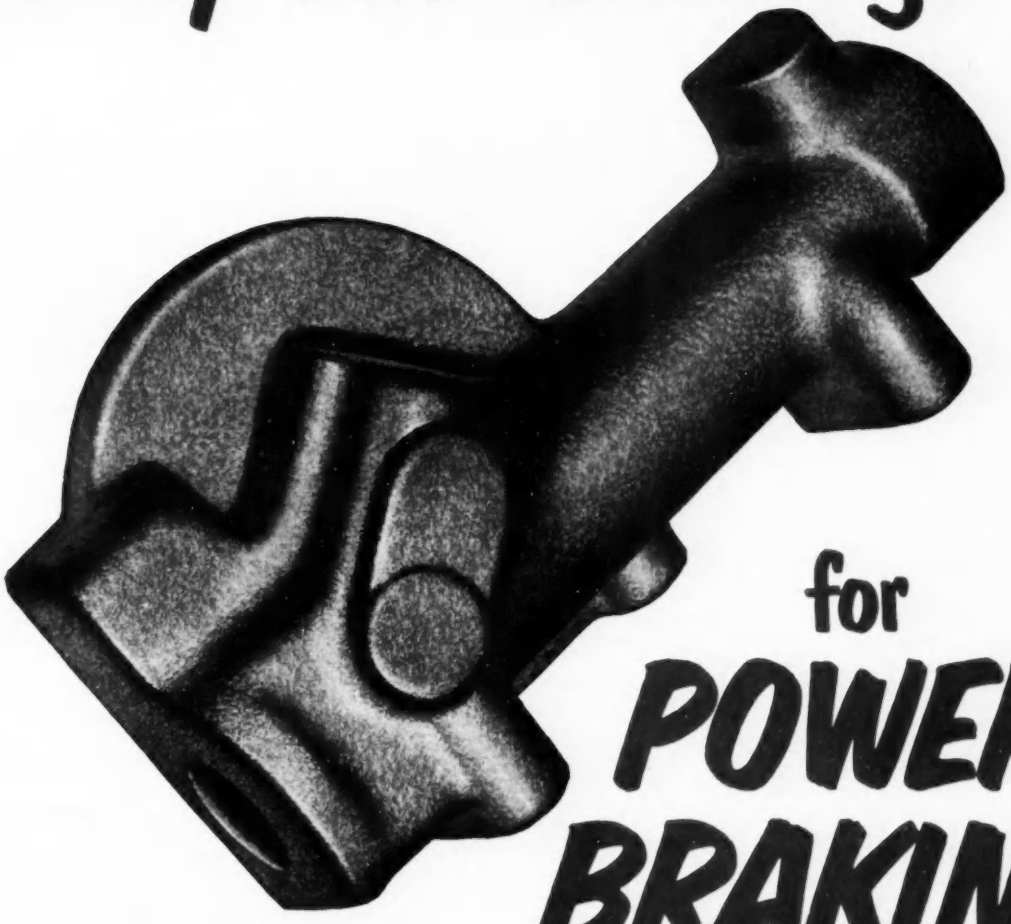
One of the unusual features of the cylinder head line is the installation of two parallel lines of Footeburt transfer machines, each one consisting of four transfer sections. Both perform the same operations, this being the only place at De Soto where parallel equipment is employed. Originally these transfer machines were operated as independent units, each one subject to operator control. Now the units are tied together by automation into a single automatic machine controlled by one operator at the loading end. However, each unit still can be operated individually to minimize down time when a unit requires attention.

The first section of this machine is composed of 15 Footeburt stations, containing 95 spindles for milling transfer pads, drilling and reaming of holes in top and bottom faces. This is followed by the Cincinnati six-station special milling machine for form-milling the hemispherical combustion chambers, described in an earlier article.

Next in line is a Footeburt section having 15 stations with 44 spindles in action for finish drilling, reaming, and chamfering holes in the ends and top and bottom.

The third Footeburt unit has 13 stations and 85 spindles in action for completing the drilling, counterboring, and tapping of all holes. In all, the three Footeburt transfer machines include 43 stations, and 224 spindles in action. The Cincinnati profiling machine is the fourth of the transfer machines tied into this single automatic process.

Eaton Permanent Mold Gray Iron Castings—



for POWER BRAKING

Send for your free copy of the 32-page illustrated booklet: "The Eaton Permanent Mold Foundry." It tells the story of Permanent Mold Castings and takes you on a picture-tour of the Eaton Foundry at Vassar, Michigan.

EATON MANUFACTURING COMPANY
General Offices: CLEVELAND, OHIO
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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

METALS——

(*Continued from page 86*)

escape holding large stocks of metal later on. When this takes place, the domestic price here will likely slip below 30 cents and may settle around 27 cents in the next two months. That's as far ahead as anyone wants to forecast.

Lead Domestic Demand Improves, Price Strengthens

Demand for lead picked up sharply early in May and was promptly followed by a price advance of ½ cent to 12½ cents per lb. Producers breathed easier. Lead executives declared business was excellent, but weakness in London quickly tempered the buying spurt almost as soon as it developed.

This has been the disconcerting pattern of the lead market. European demand appears to have virtually dried up. It is asserted that ill-advised Government buying in 1951 following the outbreak of Korean hostilities led to accumulation of large stocks of metal abroad at unreasonably high prices. This metal is now being dumped on American markets and while domestic consumption of lead during the first quarter was extremely good at a record 280,000 tons, continued heavy imports have depressed the price.

How long this selling pressure from abroad will continue is the question. European smelters are said to be resentful of the erratic fluctuations on the London Metal Exchange since free trading was established and are seriously considering eliminating it as a pricing base for the purchase and sales of their metals, and transferring their business to New York. Such a proposed move was hailed enthusiastically by officials of St. Joseph Lead Co., who feel it would eliminate unwelcome speculative movements in the metal markets.

Zinc Mining Depressed By Low Price

Much of the same comment applies to the zinc market. Demand is excellent as shown by the figures for April released by the American Zinc Institute but profits are negligible. Shipments totalled 86,156 tons, the best monthly deliveries since November, 1952. Production of slab zinc was at a daily rate of 2685 tons, about the same as for March, and stocks of metal held by domestic smelters declined 5600 tons to 94,250 tons, or hardly more than a single month's rate of shipments.

But the price remained at the unprofitable level of 11 cents per lb and showed little sign of strengthening. London continued to quote the metal as low as 7¾ cents per lb, at which it became profitable to sell in New York after paying tariff and shipping expense.

A storm of protest has come from domestic zinc miners against continued dumping of foreign metal and concentrates, and the Simpson Bill has been introduced in Congress to levy a sliding scale tariff on both zinc and lead when the metal sold below 15½ cents per lb. The proposed measure has met stern opposition from the two major smelting companies, and more important, from the Administration itself. It seems sure to encounter rough going in any event. Some of the important zinc consumers have joined the opposition forces as well. In particular, the president

Drive-in Deep Freezer Tests Aluminum Automotive Products

40° below zero cold room serves designers and project engineers

Arctic temperatures, homemade in Alcoa's laboratories, sped aluminum piston development. Many aluminum pistons were tested by parka-clad Alcoa engineers for cold-scuffing, noise-level, and expansion characteristics. Now, aluminum pistons are standard equipment in all '53 makes.

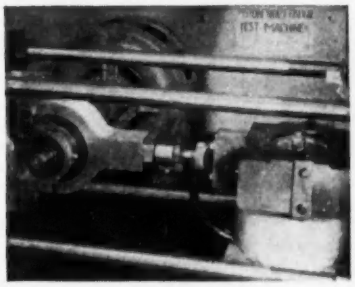
Alcoa's frigid proving ground helped meet Army deadlines for a new tank crankcase . . . clipped weeks from the development time of new valve lifters . . . found the cold-weather starting secrets of foreign diesel engines.

Like all of Alcoa's research and development facilities, our drive-in deep freezer is available to help you apply aluminum's advantages to your automotive product. To get in touch with the Alcoa engineering specialists in your field, call the nearest Alcoa sales office. Or write directly to us, outlining the project you have in mind.

Alcoa Aluminum

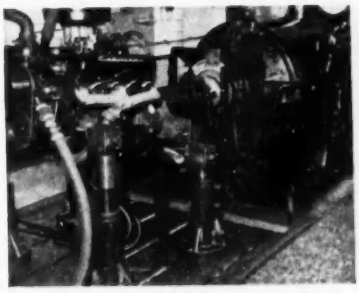
ALUMINUM COMPANY OF AMERICA

ARE YOU TAKING ADVANTAGE OF THESE FACILITIES?



Development work on aluminum pistons continues with fatigue tests on this special machine built by Alcoa.

Engineering specialists conducting torsion tests of a stiffened aluminum alloy cylinder.



One of Alcoa's battery of dynamometers for testing internal combustion engines.

ALUMINUM COMPANY OF AMERICA
1841-F Alcoa Building
Pittsburgh 19, Pa.

Please send me a copy of your "Road Map to a Better Product" outlining Alcoa's research and development facilities.

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State_____

of a leading die-casting company declares that a 15½ cent price will cut the use of zinc in die-casting by 50-60 per cent within a year and force the die-casting industry to turn to aluminum or magnesium as a substitute for zinc. This would be a major blow for zinc producers, as nearly 275,000 tons of metal are consumed annually by the die-casters.

Aluminum Producers Confident of Consumer Demand

In spite of the record daily, monthly, and quarterly figures that were set in March by the aluminum industry with an output of 104,450 tons for the month, producers notified the Government that there won't be sufficient metal after July 1st to meet full civilian demands if military needs are to be filled. As a consequence, N.P.A. was asked to discontinue stockpiling aluminum in the second half of the year. Allocation of aluminum will cease July 1st and producers anticipate there will be a lot of scrambling for metal from consumers whose inventories are far from being satisfactory.

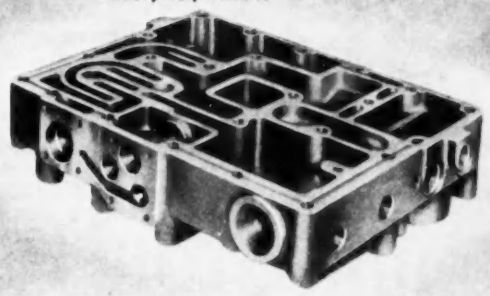
N.P.A. hasn't set definite percentage reserves for aluminum products, but has indicated about one-third of the third quarter output would be set aside for defense users. This might amount to 130,000 tons for direct and indirect defense orders in the third quarter. Producers confidently expect that new records will be set as the expansion program is completed in the months ahead. The present indicated annual production rate is about 1,260,000 tons, with the objective 1,500,000 tons by the end of the year.

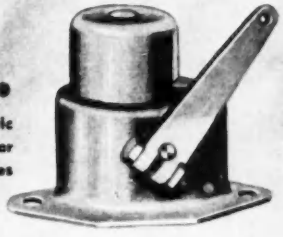
Tin Price Improves

After selling at 92 cents per lb late in April, grade A tin advanced briskly to $1 for prompt delivery in New York. Until recently, spot tin has sold for less than future positions. Political conditions affect the market quite as much as trade demand. Knowledge that RFC would quit stockpiling in 1954 would normally be a depressing market factor, for world production continues to be ahead of industrial consumption and the Government has been depended upon to take up the surplus. A real peace settlement would undoubtedly free further tin supplies. On the other hand, Communist successes that might constitute a threat to production from the important Malayan mines make short selling a decidedly

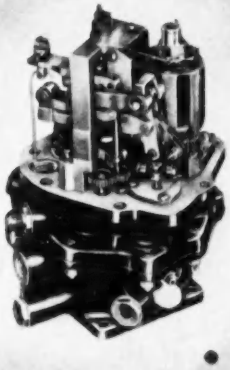
Centrifugal Governors for Automotive and Industrial Engines—Gas, Gasoline and Diesel

Transmission Controls for Heavy-Duty Vehicles

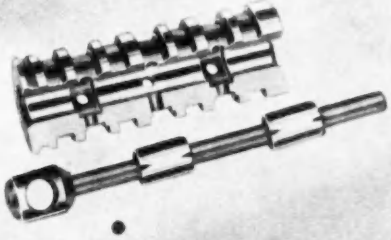




Automatic and Electrimatic Carburetor Chokes for Automotive and Industrial Engines



Fuel Controls for Turbojet Aircraft Engines



Aileron Controls for Turbojet Military Aircraft

PIERCE controls America's finest engines

let PIERCE experience work for you!

For 40 years Pierce has specialized in the design and manufacture of speed and fuel controls for automotive, agricultural, marine, industrial and aeronautical engines—and servo mechanisms for power controls. Pierce has created and produced more than 4,000 *different* governor assemblies to meet exacting problems and applications encountered by engine builders. Pierce Governors and control mechanisms are standard equipment on much of America's finest equipment.

We'd like to work with you on the controls you need. This includes carburetor choking, constant speed control, overspeed protection, overspeed safety cut-off, fuel regulation or related requirements . . . tell us your specific problem . . . complete engineering service is available.

Ask for our new brochure—"40 Years of Manufacturing Precision Controls."

THE PIERCE GOVERNOR CO., INC. • 1602 Ohio Avenue, Anderson, Ind.

"WORLD'S MOST EXPERIENCED GOVERNOR MANUFACTURER"

hazardous speculation. Another uncertainty is future output from the Bolivian mines which now are nationalized. There is a chance that Washington might pay more than the market price to provide some compensation for the owners of the mines that were expropriated.

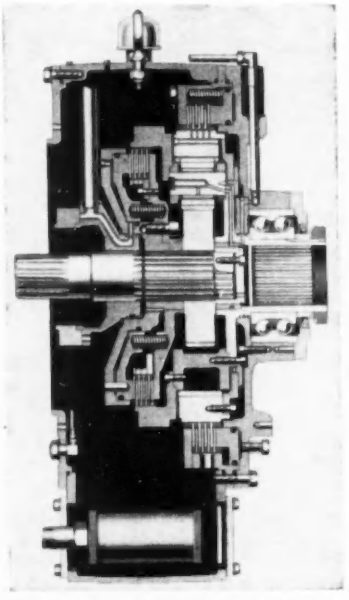
New Industrial Drives

(*Continued from page 90*)

The oil-actuated design offers definite advantages where remote control is desired as it needs only a selector valve and a seal.

The new two-speed, oil-actuated transmission was developed specifically for use with three-stage hydraulic torque converters. Designated as the Model T-302, it is engineered to obtain improved performance in torque converter installations by providing a dual range of converter operation. The unit is equipped with a direct drive and single stage planetary gear system. Two ratio spreads are available: direct drive and 2.69:1 reduction, or direct drive and 3.07:1 reduction ratio. Hydraulically actuated multiple disk clutches providing the selection of neutral, direct drive, or reduction gear drive are controlled from a spool-type valve mounted on top of the transmission. As a "package" unit, it constitutes a well-designed transmission matched to the Twin Disc three-stage hydraulic torque converter.

Designed for greater torque capacity, the new Model PO air-actuated clutch offers the heavy-duty powered equipment user a remote-controlled friction drive lighter in weight, and narrower in width than the conventional air-actuated clutch. This unusual compactness permits the new



New Twin Disc two-speed transmission, Model T-302, which gives three-stage torque converters extended performance within maximum operating range.

Model PO clutch to be installed in less shaft space, with closer shaft-bearing center distances. Air actuation is effected through insulated and air-cooled diaphragms—and is said to be unusually smooth and accurate.

Built to maintain maximum power transmission efficiency, even under adverse operating conditions, the new Model PO air-actuated clutch has all parts fabricated from specially developed alloys, for maximum strength to

An open letter to potential buyers of special machine tools and special tooling

Now, we can offer you greatly expanded facilities for the solution of your specific metalworking problems

FOR 55 years we've been designing and building special machine tools — as well as tooling and adaptations for standard equipment. But because of limited facilities, we could serve only a minimum number of you as customers in this ever expanding and increasingly important market.

Frankly speaking, we have decided that the time has come when we must be able to serve more of you. To do this job right, we are now completing a $5,000,000 plant expansion to handle this work — to help you solve your special production problems with special machinery and special tooling, big — or small.

Here are our qualifications:

EXPERIENCE: We've been in the business 55 years. During that time we have designed and built over 60,000 standard and special machine tools. *In recent years, our production of special machinery has ranged up to four million dollars annually.*

FACILITIES: Our new expansion is devoted exclusively to the production of special machinery. The new plant, built on a site covering 38 acres, is equipped with *over $2,500,000 worth of the very latest tools and equipment* — many of them custom-built for the job.

PERSONNEL: Our Special Machinery Division engineering section has at its command nearly *100 experienced, imaginative and practical design and project engineers* . . . men fully qualified in the sciences of applied mechanics, hydraulics, electronics and metallurgy . . . and metalworking.

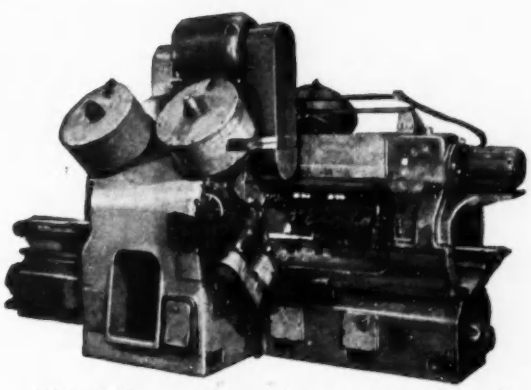
PERFORMANCE: Kearney & Trecker's Special Machinery Division is best recommended by its outstanding record of successfully solving many hundreds of unusual machining problems . . . problems that involved demands for high volume production, as well as exacting dimensional accuracy and fine surface finish.

RESPONSIBILITY: Our Special Machinery Division is an integral part of the Kearney & Trecker Corporation . . . and is fully supported by all its financial and physical resources. Any commitment for a product of this division is a commitment that fully involves the accepted reputation for responsibility and satisfaction that is Kearney & Trecker's.

We invite your inquiry

We'll be glad to provide you with any information we can . . . including sample machine specification sheets on typical installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service. Furthermore, if you have special production machinery problems, have one of our senior Project Engineers analyze them, without obligation, of course.

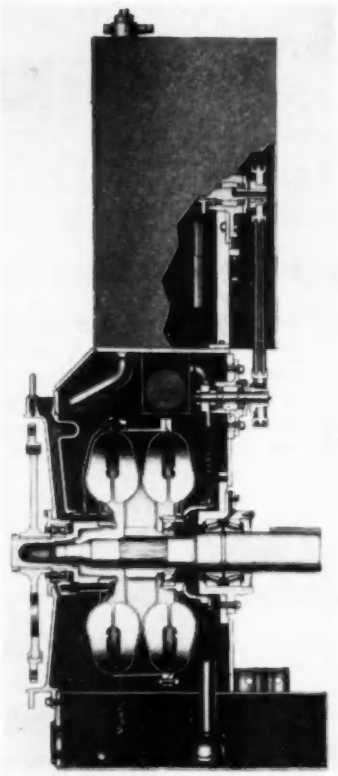
Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



We've built special machines or adaptations of standard equipment for practically every industry. Here is a photo of a transfer-type milling machine we designed and built for a major automotive manufacturer.

withstand heavy shock loads and tooth wear. It is offered at present in two and three plate, 24-in. size.

The new disconnecting hydraulic power take-off — designed to provide the heavy-duty powered equipment user with more effective hydraulic linkage for heavy-duty applications requiring quick, positive disconnect of power source from driven equipment —is designated as the Model HUD.

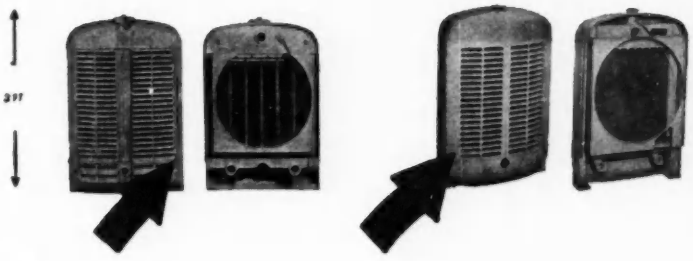


Disconnecting hydraulic power take-off, Model HUD, available in coupling sizes 21 in. and 27 in., to handle engines from 60 hp to 600 hp. It contains an independent cooling radiator, with fan drive and cooling fan assembly.

Wherever loads have to be lifted, swung, or twisted under conditions involving frequent shocks and high starting torque, the new Twin Disc Model HUD utilizes peak torque from any type engine while providing a fluid protection against starting loads, shock loads, and overloads.

By redesigning the present Model HUD, which incorporates the Twin Disc double-circuit coupling, Twin Disc engineers have achieved more compact installation dimensions to meet space limitations, by providing an integral unit which contains an independent cooling radiator, together

The trend is to more stampings WITH Bliss PRESSES

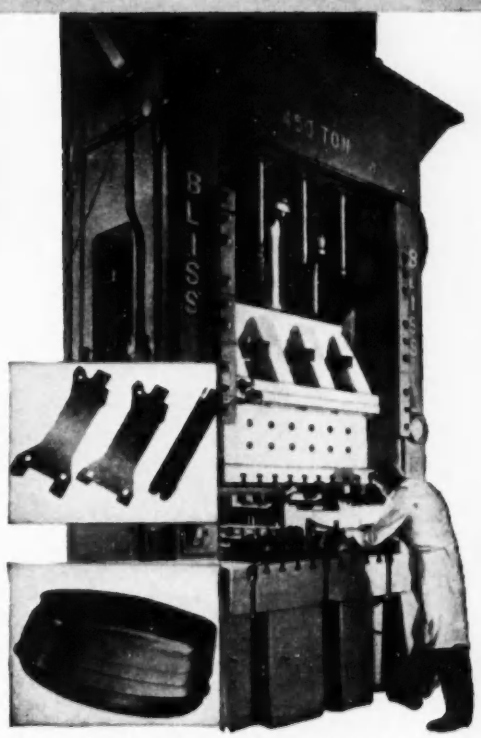


Casting-to-Stamping saves as much as 30% for Young Radiator Company

When Young Radiator Company, Racine, Wis., decided to redesign their line of automotive and industrial radiators, their thoughts turned to lighter, stronger, more clearly designed components. To gain these new design objectives, they converted from castings to stamped steel parts. And as they had done for 20 years, they asked Bliss to specify the right press for the job.

Bliss engineers studied the problem, recommended a 450-ton single-action Hydro-Dynamic press. Result: savings up to 30 percent; weight of the radiators halved; strength increased.

Says President F. M. Young, "We've long been advocates of Bliss presses and service." Proof of the statement is the fact that 70 percent of Young's pressroom is Bliss. Why not bring *your* metal-forming problem to Bliss? You'll find—as Young Radiator did—that Bliss has a press for almost every metal-forming operation.



Shown here are the second and third forming operations on radiator side members (inset, top). A third die handles initial piercing. A Bliss hydraulic cushion ejects the stamping... is also used as blankholder to draw the shell. Shells are center-split to form top and bottom of radiator housings (inset, bottom).

E. W. BLISS COMPANY, CANTON, OHIO
E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. West Coast Representatives: Moore Machinery Company, Los Angeles and San Francisco; Star Machinery Company, Seattle. Other dealers in United States cities and throughout the world.

Bliss

on your press is more than a name... it's a guarantee!

with the necessary fan-drive and cooling-fan assembly.

With the new disconnecting power take-off, impact shocks between driving and driven equipment are reduced 70 per cent or more, through the energy-absorption ability of the fluid circuit.

Controlled by the operator, disconnection on the Twin Disc disconnecting hydraulic PTO is actuated from a master control valve, which operates differential pressure valves to dump the oil within the HUD into a reservoir in a matter of seconds. New type rubber diaphragm valves operating in a radial direction accurately allow for fluid dumping and re-filling. Release is said to be complete and positive.

The new HUD eliminates the critical problem of coordinating engine throttle, drum clutch, drum brake, etc. Now the drum clutch can be engaged with engines idling. The load can be picked up easily, simply by opening the throttles. Multiple engines can be synchronized while operating at slightly differently speeds.

Compactly designed for limited space application, the new Model HUD, disconnecting power take-off is available in coupling sizes 21 and 27 in.—to handle up to 600 hp engines.

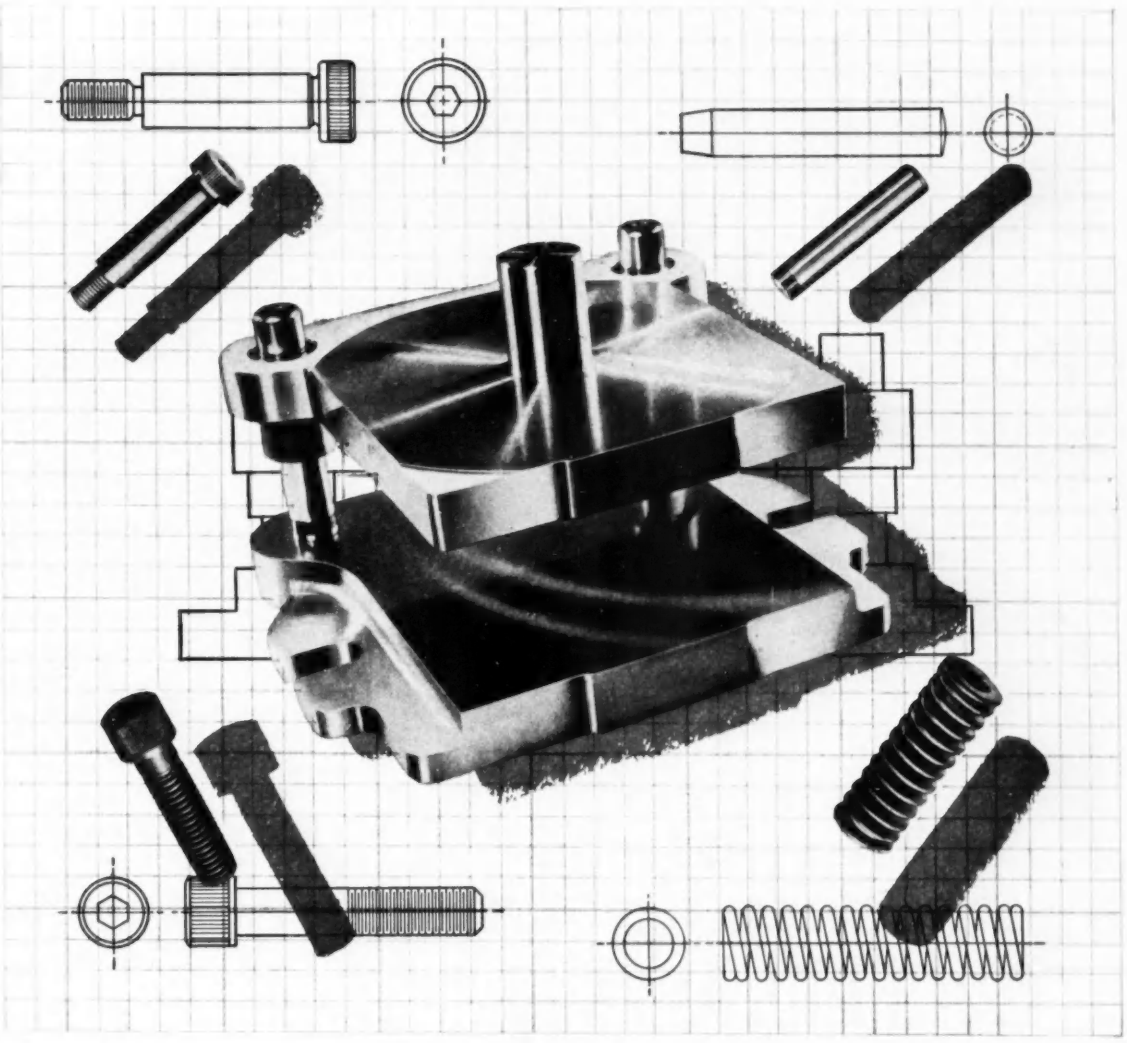
Studebaker's Body Plant

(*Continued from page* 72)

as the front end. Then the buggy enters the first framing fixture where it is centered and clamped, then the welding is completed. The second open station affords plenty of space for the installation of the roof. The roof then is welded in place at the second framing fixture.

On the second floor Studebaker has one of the "firsts" in a modern body shop—a Ransburg electrostatic spray booth of latest type for automatically priming the underbody. As illustrated, the body assembly enters the spray booth while suspended on an overhead conveyor line which raises it above the level of the spray guns. Spraying is completed in an extremely fast cycle while the body is moving through the spray booth. Typical of the latest type of Ransburg equipment, the booth is provided with two banks of three spray guns, the guns being of cone shape and automatically rotated. This procedure is fast and economical since there is little or no overspray and exceedingly small loss of material. Moreover, the distribution of paint spray due to the pattern of the electrostatic charge, combined with centrifugal force due to cone rotation, is such as to reach even normally inaccessible places without difficulty.

As the bodies come out of the spray booth they enter a Fostoria infra-red drying tunnel, arranged with a bank of infra-red lamps on the floor. In the interest of space economy, the tunnel is composed of two sections at right angles to each other, giving an effective length of about 115 ft within a relatively restricted space.



THERE'S A DANLY STANDARD TO MEET YOUR DIEMAKING SPECIFICATIONS

In nearly every instance, Danly can meet your diemaking specifications with *standard* Danly Die Sets and *standard* Danly Diemakers' Supplies. Eliminate delay between design and production . . . you can be sure of prompt delivery from completely stocked Danly branch assembly plants located in major toolmaking centers.

More than 30 years' experience in supplying diemakers' needs has established Danly's reputation for design excellence and dependable accuracy. Diemakers everywhere *prefer* Danly!

Plan now for faster tooling *and* longer production runs at less cost . . . with Danly Die Sets and Danly Diemakers' Supplies.

Call Your Local Danly Branch Today!

***CHICAGO** 50—2100 S. Laramie Ave.
***CLEVELAND** 14—1550 East 33rd St.
***DAYTON** 7—3196 Delphos Ave.
***DETROIT** 16—1549 Temple Ave.
***GRAND RAPIDS**
113 Michigan St., N.W.
INDIANAPOLIS 4—5 West 10th St.
***LONG ISLAND CITY**—47-28 37th St.
***LOS ANGELES** 54—Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2—111 E. Wisconsin Ave.
***PHILADELPHIA** 40
511 W. Courtland St.
***ROCHESTER** 6—33 Rutter St.

**Indicates complete stock*

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois

DIE SETS AND DIEMAKERS' SUPPLIES

CALENDAR

OF COMING SHOWS AND MEETINGS

1st Annual Michigan Motor Show, State Fair Grounds, Detroit..June 2-.

SAE Summer Meeting, The Ambassador and Ritz-Carlton, Atlantic City, N. J. .....June 7-12

2nd International Aviation Trade Show, Hotel Statler, New York, N. Y. .....June 9-11

Washington Conference, Machinery & Allied Products Institute, Statler Hotel, Washington, D. C. June 11-12

Le Mans 24 hr. race, France ...June 13-14

Exposition of Basic Materials for Industry, Grand Central Palace, New York, N. Y. .....June 15-19

14th Iowa Management Course, State U. of Iowa, Iowa City..June 15-27

American Welding Society, National Spring Technical Meeting, Shamrock Hotel, Houston, Tex. June 16-19

General Management Conference, American Management Assn., Hotel Statler, New York, N. Y. June 17-19

British Empire Trophy Race, Isle of Man .....June 18

Motor Vehicle Fleet Supervision Course, Northwestern U. Traffic Institute, Evanston, Ill. ...June 22-26

Motor Fleet Supervisor Refresher Seminar, Northwestern U. Traffic Institute, Evanston, Ill..June 25-26

20th International Aeronautical Meeting, Le Bourget Field, Paris, France .....June 26-July 5

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J....June 29-July 3

Sixth Annual International Aviation Exposition, Detroit, Mich. ..July 9-12

SAE International West Coast Meeting, Georgia Hotel, Vancouver, B. C. .....Aug. 17-19

National Aircraft Show and 50th Anniversary of Powered Flight, Vandalia Airport, Dayton, O..Sept. 5-7

Society of British Aircraft Constructors' Display, Farnborough .....Sept. 7-13

SAE National Tractor Meeting and Production Forum, Hotel Schroeder, Milwaukee, Wis. Sept. 14-17

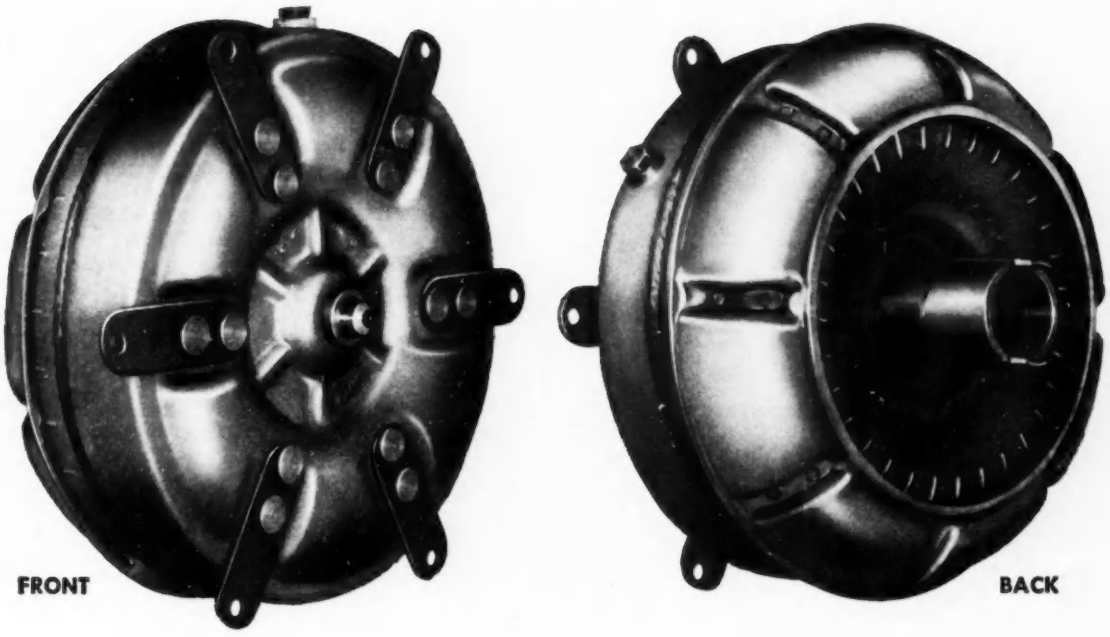
Eighth National Instrument Conference and Exhibit, Chicago, Ill. .....Sept. 21-25

Paris Salon, France .....Oct. 1-11

38th International Motor Show, Earls Court, London .....Oct. 21-31

American Society of Tool Engineers, semi-annual membership and board meeting, Dayton Biltmore Hotel, Dayton, O. .....Oct. 30-31

Montreal Materials Handling, Tool and Industrial Equipment Shows, Show Mart, Montreal, Que. .....Nov. 9-13



Converter is easily adapted to most power units. Made almost entirely from stampings for low-cost production.

Welded for strength, with leak-proof construction. Designed for direct air-cooling, but oil cooler may be added.

You Equip WELL...at LOW Cost with LONG TORQUE CONVERTERS!

Designed and built to hold *your* costs down in most applications. Long Torque Converters are now in high-volume production for passenger car use. Easily modified for many industrial uses. We are prepared to extend engineering cooperation through to satisfactory installation. Your inquiries are invited.

For Automotive and Industrial Applications:

- Eleven and 12-inch diameters.
- Ninety to 200 lbs.-ft. torque.
- Torque ratios at stall, 2.1 to 1.
- Efficiencies over 90%.

LONG MANUFACTURING DIVISION • BORG-WARNER CORP.
DETROIT, MICH., AND WINDSOR, ONT.

50 Years of Quality Manufacturing for the Automotive Industry

LONG

A PRODUCT OF BW BORG-WARNER

TORQUE CONVERTERS • CLUTCHES • RADIATORS • OIL COOLERS

Shell Molding Opportunities

(*Continued from page 69*)

where cores can be eliminated by the use of the process.

At our Saginaw malleable iron plant, where quite a few castings are made by this method, we use a continuous pendulum-type conveyor with shell-making machines set parallel to the conveyor.

The shell-making machine is an integrated mechanism operating in cycles and consisting of a gas-fired, radiant-burner oven, a rollover box containing the sand-resin material, and the pattern mounted on a hinged arm. Adjacent to this machine is a vibrator-actuated container which holds dry resin used for gluing the shells together, a fixture for knocking out the top of the pouring sprue and a jolt-squeeze machine which is used in the gluing operation to press the halves of the shell together.

At the start of the cycle, the hot patterns, both cope and drag, are lowered onto a rollover box which contains a sand-resin material from which the shells are made. The rollover box and pattern are then inverted for about 20 sec which is the approximate time needed for enough of the material to adhere to the hot pattern to make a shell about 5/16 in. thick.

When the shell is ready for curing, the rollover box returns to its original position. The shell and pattern mechanically enter the gas-fired, radiant-burner oven for curing. The amount of curing time will vary with the thickness of the shell—for example, a shell 5/16 in. thick requires approximately 40 sec.

After the shell is cured, the door of the oven rises and the mechanical arm carrying the pattern and shell moves to a vertical position parallel to the furnace door. Spring-loaded ejector pins release the shells from the pattern. The operator places the drag half on the gluing fixture, and the cope half is placed on the holder which knocks out the top of the pouring sprue. He positions the resin container which vibrates dry resin onto the shell and then places the cope half onto the drag half and touches the controls which automatically move the squeezehead of the gluing machine into position. The machine presses the halves together for a predetermined length of time sufficient to assure a firmly-bonded complete shell.

The completed shell is placed on the pendulum conveyor and moves to the pouring station. After being poured, the shells remain on the continuous conveyor for a short cooling period. When they arrive at the shakeout screen, a cam-actuated mechanism tips the conveyor plates, and the shell and castings are dumped onto the shakeout screen. The sand is vibrated through the screen, and the castings drop into a hopper below.

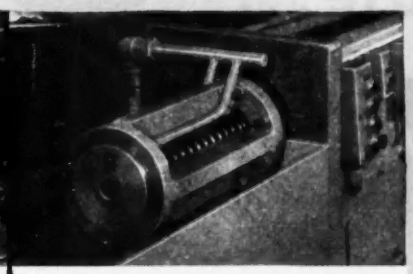
There will be further, rapid development in this interesting technique of making castings.

when designing

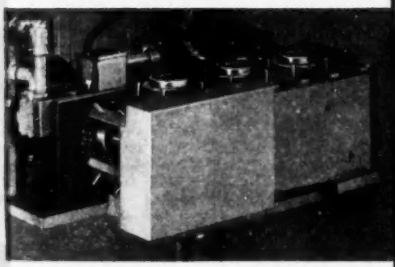
BROACHING FIXTURES

you need more than just a "hunch"!

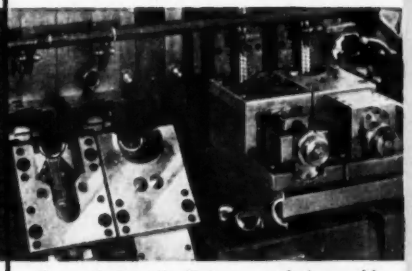
Close tolerance and exact spacing of holes in tank track shoes are made possible by this Lapointe V-8 Broaching Machine fixture.



Broach die-holding fixture, specially designed for easy coolant access and disposal of chips.

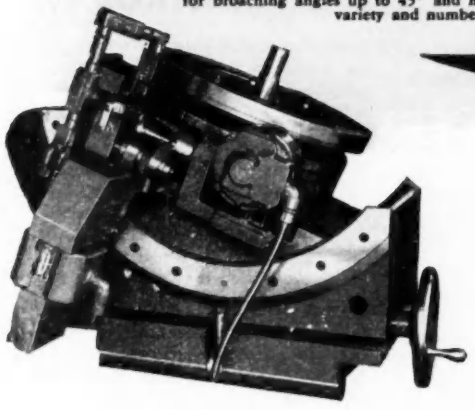


Operated unattended because of several built-in safety features, the Lapointe VU-3 Broaching Machine can broach helical splines in automotive gears through the use of this conveyor fixture.



The "Tip-Down" Fixture, exclusive with Lapointe, tips down to a position for easy loading, minimizes operator fatigue. Shown here on 15-ton Lapointe DRV Machine, for broaching connecting rods and caps.

Lapointe Universal Compound Angle Indexing Fixture, for broaching angles up to 45° and maximum variety and number of slots.



Varied fixture requirements of the different types of broaching machines — single ram and double ram, vertical and horizontal — call for engineering skill in fixture design that can only be gained through long experience. Lapointe engineers, with their 50 years of background, can refer to countless designs involving fixture principles that show remarkable ingenuity.

Whether, therefore, your need is for a broaching fixture that is simple or complex, manual or automatic, come to "fixture headquarters" . . . come to **LAPOINTE.**

Literature on broaching machine fixtures can be obtained by addressing Department 10

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

SHORTIES

The wings of a late-model plane must have 35 hatches through which mechanics and inspectors can check the intricate machinery housed inside.

•

In an automobile alone there are an estimated 81 lb of cold finished bars — rounds, squares, hexagons, flats and many hundreds of special sections.

•

Approximately 1.010 million U. S. military deaths have occurred in all the wars in U. S. history, but nearly 1.050 million deaths have resulted from all highway accidents since the first U. S. automobile fatality occurred 53½ years ago.

•

Gasoline taxes paid by American motorists and other consumers during 1952 reached a record sum of nearly $2.8 billion.

•

The average aircraft gas turbine uses about 60 lb of air to each pound of fuel.

•

The quantity of air per pound of fuel used by the average air-cooled engine varies greatly with the various piston engines, their internal make-up, installation, etc. It ranges, however, from about 60-1 down to about 25-1.

•

Of the 10 top-valued industries in the U. S. today, only four were in existence at the turn of the century.

•

From an average 59 F on earth, the mercury drops to —67 F at about 35,000 ft, then climbs to 170.6 F midway in the stratosphere.

•

Total federal, state and local truck levies in 1952 reached $1.4 billion, or about 35 per cent of all special highway user taxes.

CAN YOU LIFT AN IDEA FROM THIS?

● Inside that jack, the lifting cylinder must withstand concentrated pressures. Outside, the housing gets rough service.

What material would you use to do the job?

Manufacturers of hydraulic jacks use Republic ELECTRUNITE Welded Steel Tubing . . . whether they make jacks that raise cars . . . or houses. They find ELECTRUNITE has the high strength that stands up under this kind of pressure. Takes rough service in stride.

Republic ELECTRUNITE is often cheaper. It's uniformly concentric, and that eliminates costly machining for close-tolerance parts. Makes a strong jack handle, too.

There may be a place for Republic ELECTRUNITE Welded Steel Tubing in something you plan to produce. Or in your present products. We'll be glad to help put ELECTRUNITE Tubing to work for you . . . in the right places. Just write:

STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
227 EAST 131st STREET • CLEVELAND 8, OHIO

REPUBLIC STEEL

Republic ELECTRUNITE TUBING

MADE BY THE PRODUCERS OF ELECTRUNITE...THE ORIGINAL ELECTRIC WELDED BOILER TUBE

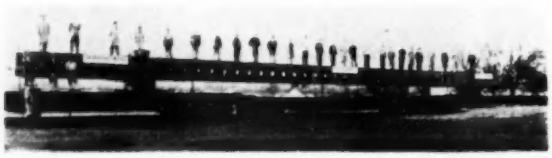
News of the

MACHINERY INDUSTRIES

(*Continued from page 73*)

Div., GM, whose paper on shell molding and other new techniques was extracted along with other technical papers read at the meeting in this issue of AUTOMOTIVE INDUSTRIES.

In addition to the technical meeting, the Society elected new officers for the 1953-54 term. These are: President, Collins L. Carter, president and general manager, Albion Malleable Iron Co.; and Vice-President, Frank J. Dost, president, Sterling Foundry Co.



The huge stretcher column shown in the illustration will be used in the construction of a stretch press that will have a 3 million lb pull. Press is to be installed in the Lafayette, Ind., Works of Alcoa.

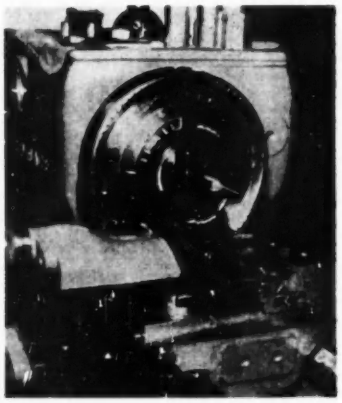
Machine Tool Familiarization

Rochester Institute of Technology will hold its Eighth Machine Tool Familiarization program for sales and service personnel from June 10 through June 19. The staff will be composed of representatives of machine tool builders and equipment manufacturers, augmented by members of the Institute's faculty.

Tube Reducer

A large compression-method tube reducing machine now under construction for Tube Reducing Corp., Wallington, N. J., will increase by several fold the size of tubes that may be cold sized by the process, according to the company. The machine will process ingoing tubes up to 18 in. OD. Most of the tubing to be produced by the new equipment will be used for the aircraft and rocket program. In addition to processing high alloy steels, aluminum, copper and brasses, and stainless steel, it will also handle titanium and other less common metals.

FLAME HARDENING

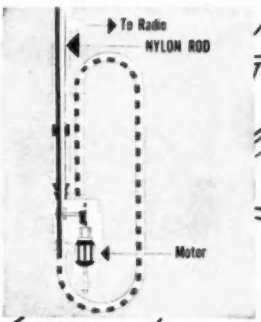


The effect of flame-hardening lathe bedways is shown as a lathe bed segment fashioned into a cutting tool turns 1112 bar stock. This demonstration took place on a Cincinnati Tray-Top lathe during the open house sponsored by Cincinnati Lathe & Tool Co. for its dealers recently. The hardness pattern of the bed segment shows up in the illustration as a dark area.

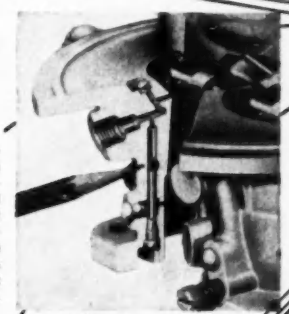
How mechanical parts of

DU PONT NYLON

give improved performance

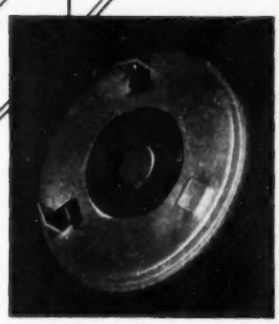


Automatic antenna has a flexible rod of Du Pont nylon that raises and lowers the "live" members. Nylon was the only material flexible enough to fold into the trombone-like position, yet rigid enough to force the antenna up and down.

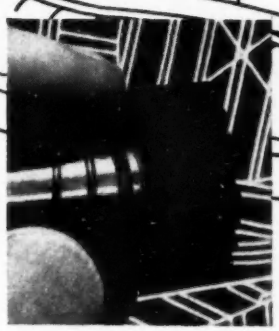


Carburetor performance is improved with automatic spark-control unit that has ball check valve of Du Pont nylon. Lightweight nylon reacts instantly to pressure differentials . . . resists electrolytic and chemical corrosion.

Door-lock wedge of Du Pont nylon provides superior abrasion resistance, high resistance to repeated impact of door slamming. No maintenance required—needs no lubrication. Injection-molded production cuts costs.



Pedal-toeplate bumper seals with washers of nylon enabled engineers to cut in half the space required for floorboard clutch and brake seals. Du Pont nylon withstands abrasion . . . seals out noise, fumes, dirt and water.



Production operations were cut from five to one when this speedometer take-off drive gear was molded of Du Pont nylon to close tolerances. Long-wearing nylon resists abrasion . . . runs quietly . . . lasts life of the car.

Illustrated here are five examples of how Du Pont nylon plastic is improving performance and reducing costs of automotive parts. Forward-looking engineers are blueprinting many of their new ideas through Du Pont nylon's unique combination of mechanical and electrical properties.

Perhaps nylon's proven properties can help you engineer your present problem or future idea. For full information, write: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept., Room 176 Du Pont Bldg., Wilmington 98, Del.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY
Polychemicals
DEPARTMENT
PLASTICS • CHEMICALS

Dow Corning Celebrates

(*Continued from page* 34)

semi-plants for the production of silicone intermediates, distillation units, and finishing plants.

New Products

In addition to the impressive physical facilities of the company, the visiting group of editors was also introduced to a host of new products that Dow Corning has recently developed. Of special interest to the electrical industry are a new magnet wire enamel that is said to be completely serviceable at Class H temperatures (180 C), two Class H varnishes and a new silicone bonding resin with greater ease in handling and longer dielectric life, and Silastic R tape for forming a resilient Class H insulating jacket for preformed coils.

Of notable importance to the aircraft, automobile, and electrical industries are two new Silastic stocks that are easier to fabricate and engineered to yield longer service.

Among the new silicon resins disclosed were one for formulating air-drying silicone paints for the industrial maintenance market, another that can be foamed in place to form a light-weight cellular structure with extremely high heat resistance, and others for low-pressure laminating and molding compounds. Water repellents for textiles and leather, along with adhesives for pressure sensitive tapes, were other features in the seemingly endless parade of silicone applications.

Dow Chemical

After concluding their tour of Dow Corning Corp., the visiting editors were conducted on a brief survey of the Dow Chemical Co. plant. This mammoth facility, which contains over 1000 acres and 28 miles of railroad tracks, is busily engaged in the production of many types of chemicals and plastics, as well as in furthering the development of new uses for the huge quantities of magnesium currently being produced at its Freeport, Tex., plant.

Activities in the Plastics Div. were of special interests to the automobile industry. There is continuing work in progress on polyvinyl chloride dispersions for auto bodies, concentration on extended uses of coated fabrics in cars, and development of a new resin additive for paints, known as "vinyltoluene," which is expected to afford greater compatibility with oils and to be readily solvent in any aromatic solvent. It may well prove extremely useful in paints for automobiles.

Seiberling to Make Tires for Standard

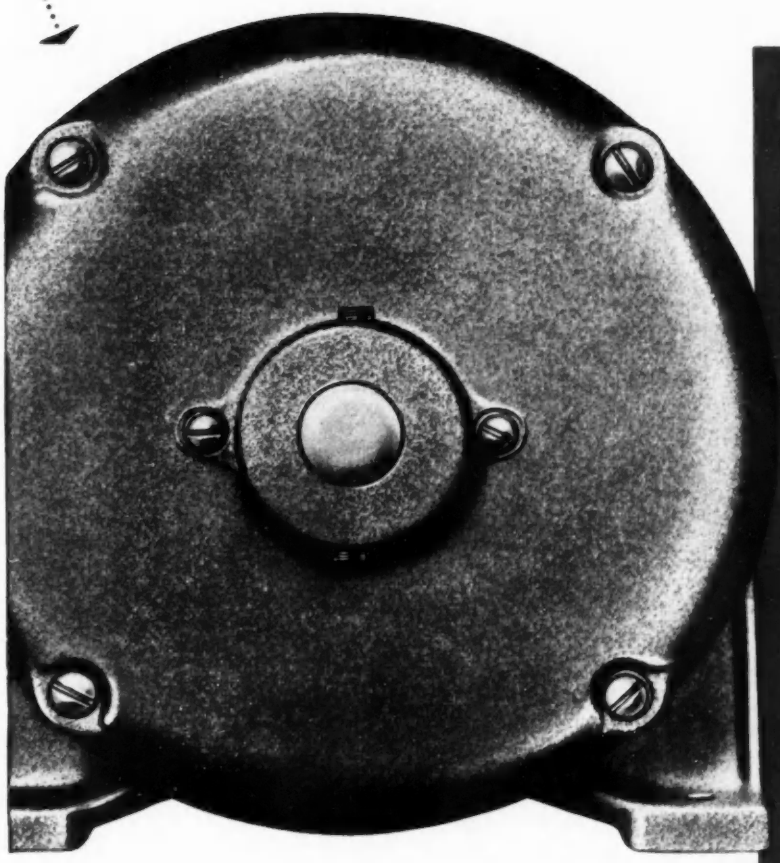
For the first time in its history, Seiberling Rubber Co. will produce tires for sale by an outside agency under a trade name other than the Seiberling brand. Under an agreement with Standard Oil Co. of Ohio, Seiberling will manufacture tires to be sold by the oil company's retail outlets under the Atlas brand name. The rubber company says the deal will enable it to use its expanded production facilities to fullest advantage and also to stabilize its production.

Canadian Firm to Sell Flxible Coach Line

The Twin Coach Co. of Canada, Ltd. under an agreement with Flxible Co. of Loudonville, O. will handle all Canadian sales of motor coaches made by Flxible. Flxible has assumed all bus manufacturing and sales operations of Twin Coach Co. in the U. S.

To get more service with less servicing...

replace with **Delco Motors**



Compare Delco motors with others. You will discover they have greater endurance under load... require minimum servicing ... for every type of Delco motor is designed, engineered and built to precision standards inside and out.

Whenever you need replacement motors ... fast ... call your local Delco wholesaler. Delco motors are available everywhere for immediate delivery.

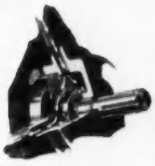
THERE'S A DELCO
FOR PRACTICALLY ANY
INDUSTRIAL APPLICATION

Open and enclosed motors up to 100 hp for standard foot mountings. NEMA C&D flange-mounted motors up to 30 hp. Explosion proof motors up to 20 hp.

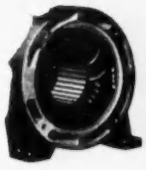
THESE FEATURES KEEP DELCO MOTORS GOING LONGER

Water-Tight Conduit Box. Protects against moisture.

Positive Lubrication. Lengthens bearing life.



Delcote Insulation. Permanently flexible, moisture-proof, wear resistant.



Positioned Bearings. Maintain shaft alignment.

Dynamically Balanced Rotor and Shaft Assembly. Reduces vibration.

Corrosive-Resistant Cast Iron Frame. More solid, more rugged.

DELCO DAYTON OHIO

DELCO PRODUCTS

Division of General Motors Corporation, Dayton, Ohio

A GENERAL MOTORS PRODUCT — A UNITED MOTORS LINE

DISTRIBUTED BY WHOLESALERS EVERYWHERE

SALES OFFICES: Atlanta • Chicago • Cincinnati • Cleveland
Dallas • Detroit • Hartford • Philadelphia • St. Louis • San Francisco

New Industrial Engines

(*Continued from page 37*)

gines at a continuous operating speed of 2500 rpm is 105, 120, and 240 hp respectively. Torque for the two engines is 224 lb ft at 1400 rpm and 264 lb ft at 1000 rpm respectively. Compression ratios are 6.55 to 1 with gasoline for the smaller engine, and 6.4 to 1 with gasoline and 8.4 to 1 with LPG for the larger.

Future plans of the new Reo division include investigation and development of quad units, power generator sets, larger units, and possibly a four-cylinder unit, all to be with the maximum number of interchangeable parts consistent with good engine design.

White Motor Co. is actively getting into the industrial engine business. Initially it is offering its 100 series regular basic truck engine with special modifications for wide industrial use. Larger series of engines will come later. White explored the industrial engine field for about a year before deciding to go into the business.

The Detroit Diesel Engine Div. of General Motors also introduced a new heavy duty engine at the International Petroleum Exhibition in Tulsa May 14.

For Drilling Rigs

The new unit, called Twin 6-110, combines two engines on one base available both with or without torque converter drive, is designed for the drilling industry. The engine develops 505 hp without torque converter drive at 1800 rpm. The engines are compounded to the single shaft by means of a high-velocity chain drive. Chain, sprockets and bearings are completely enclosed and are pressure lubricated. Unit weight is about 12,000 lb.

The General Motors torque converters used on this model are designed to permit the release of either engine from the load simply by dumping the torque converter oil into a sump tank. This is accomplished instantly without the use of friction clutches. The chain case of the engine compound serves as the temporary oil container when this is done. Both engines are cooled by one radiator and a single fan which is operated through high-capacity over-riding clutches by both or by either one of the engines.

The other new product shown was a 12½ kw permanent magnet generator. It requires no maintenance other than normal servicing of the small Diesel engine that drives it. The engine is a two-cylinder model of the new "51" series.

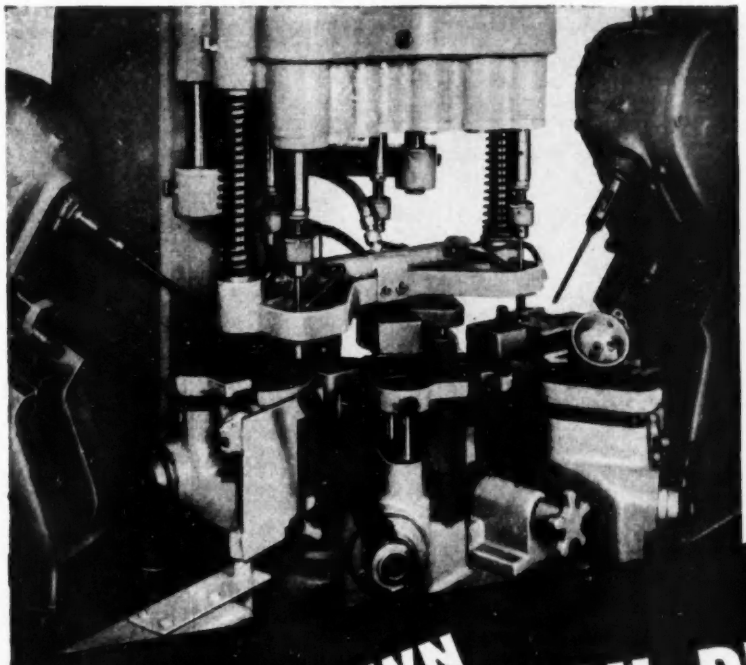
Twin Disc Forms Japanese Firm

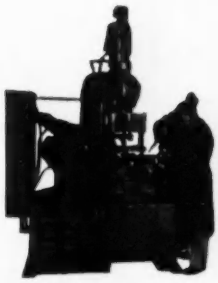
Twin Disc Clutch Co. has acquired a partial interest in a new firm at Kamo, Japan, called the Nugata Converter Co. which will build torque converters.

High Strength Bodies

The Galion Allsteel Body Co., Galion, O., announced that it is now using high tensile steel exclusively in the construction of its dump truck bodies, ranging from three to 27 tons.

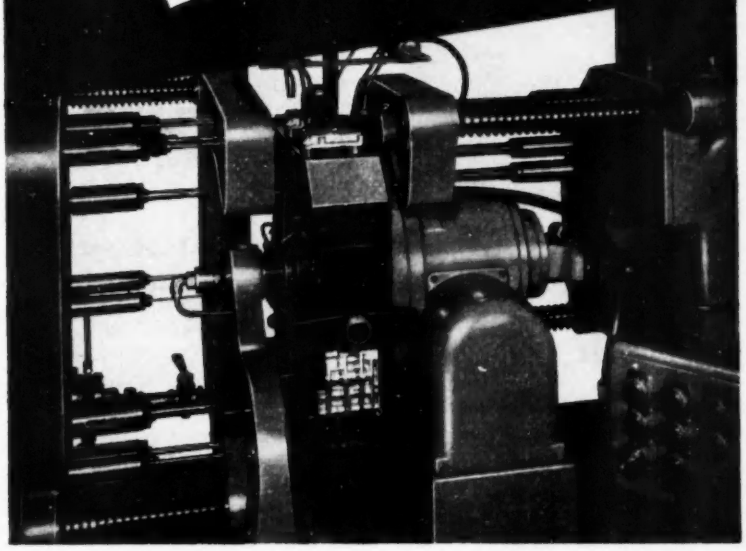
Use of this material, previously employed only in special extra-cost heavy-duty bodies, will make possible over-all weight savings up to 25 per cent, according to Oliver C. Henkel, president. High tensile steel employed in the new Galion bodies has a minimum yield point of 50,000 psi, as compared to 25-30,000 psi for the hot-rolled carbon steel previously used. It has four to six times greater corrosion resistance than ordinary mild steel, and improved resistance to abrasion, comparing favorably with .30 to .40 carbon steel.

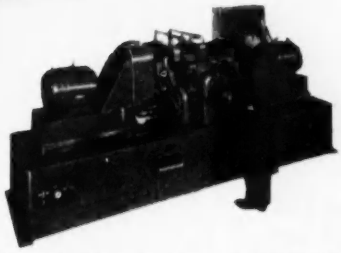




Closeup at the left shows a six station Hartford Automatic single purpose machine rough and finish reaming two cored holes, plus drilling two holes at different angles in die cast aluminum housings.

The LOWDOWN on HIGH PRODUCTION





This view shows a four station Hartford vertical dial type machine drilling, coredrilling and counterboring five holes in aluminum valve bodies.

Hartford Special is ready to design and build a special purpose drilling and tapping machine to boost your production, too. Why not write for more information.

When it comes to production —

HARTFORD *Special*

SUPER-SPACERS

Automatic THREAD ROLLERS

THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

New Products

For additional information please use postage-free reply card on page 81

(*Continued from page* 80)

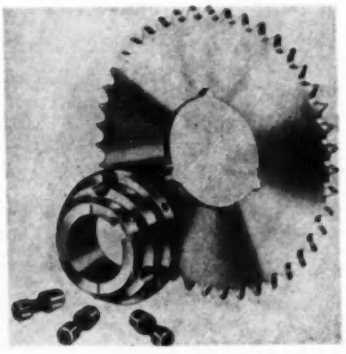
force of the floating weight moving in a direction opposite to the skid or sway, according to the manufacturer.

The floating weight is held in a centered position by two large compression springs. The complete stabilizing unit weighs 45 lb. *Dietrich Products Corp.*

Circle P-8 on page 81 for more data

Roller-Chain Sprockets

Recently announced is a line of Grip-Master roller-chain sprockets that are said to incorporate many important advantages. It is claimed, for example, that they eliminate reboring. This is accomplished by using different tapered split bushings or split hub type.



The units are reported completely dependable for a wide variety of applications. They are available in packaged form with complete mounting instructions. *Cullman Wheel Co.*

Circle P-9 on page 81 for more data

Silicone Varnish

A new high in heat endurance among electrical insulating resins has reportedly been established with the introduction of silicone varnish 994. It is designed for coating glass cloth and sleeving and for bonding mica-glass combinations.

Initial dielectric strength is said to be in the range of 1600-1900 v per mil. It is claimed that this strength is still retained after 2000 hours at 250 C. *Dow Corning Corp.*

Circle P-10 on page 81 for more data

Strippable Coating

Recently developed is a protective, strippable coating called Spray-strip. The product is said to be capable of cold application by spray, brush or dip method and may be applied to either metallic or wood surfaces. *Eagle Chemical Co.*

Circle P-11 on page 81 for more data

Back-up Pad Assembly

Recently announced is a back-up pad assembly for use on all standard grinders and polishers. It consists of a sanding head, three back-up plates (one nine in., one seven in. and a five-in. plate), a special retainer bushing, and a quick-change retainer nut.

A two-deg taper provided by the plates is said to permit more disk grinding surface to be used, while the plate assembly provides good support for attaining greater disc cutting life. *Minnesota Mining and Manufacturing Co.*

Circle P-12 on page 81 for more data

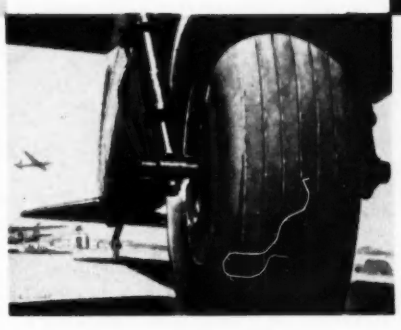
(*Turn to page* 124, *please*)

OSTUCO TUBING is versatile!

OSTUCO TUBING is versatile!

OSTUCO TUBING is versatile!

OSTUCO TUBING is versatile!



OSTUCO TUBING is versatile!

a basic material in better design

From industry's drawing boards come more and more plans for products using OSTUCO Steel Tubing. Strong, light weight, easy to form, OSTUCO Tubing is found in everything from shock-absorbers to sewing machines and tricycles to table lamps. Biggest users of OSTUCO Tubing are industries famed for their standards of high quality—manufacturers of aircraft, automobiles, appliances, electric products, tools, and machinery.

Having our own steel source as a member of the Copperweld family and with facilities modernized and greatly expanded, The Ohio Seamless Tube Company is now, more than ever, *your best single source* . . . a tubing specialist that manufacturers, forges and fabricates all at one plant. Consult our experienced engineers about OSTUCO Tubing for your current requirement or for redesigning your products. Write for new informative catalog, "Ostuco Tubing."

THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing

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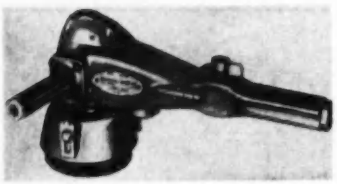
NEW PRODUCTS

For additional information please use postage-free reply card on page 81

(*Continued from page* 122)



Air-Powered Angle Grinder Without Gears

Recently introduced is a new air-powered, direct-drive angle grinder without gears of any kind. Known as Size 2FA-60, it has a speed of 6000 rpm at 90 psi air pressure.

Two types of dead handles are available; one is straight, and the other is 30 deg off of straight. They may be attached to either side of the grinder, and the angle dead handle may be rotated to any one of four positions.

A built-in lubricator is said to provide ample lubrication for long, trouble-free service. Heavy-duty ball bearing construction and a quick-acting throttle are other features. *Ingersoll-Rand Co.*

Circle P-13 on page 81 for more data

Paint Can Attachment

Now available is a paint can attachment which prevents paint from spilling over when pouring or mixing. The plastic can-enlarger is attached by pressing firmly into gallon can to make a seal. *The Pormix Corp.*

Circle P-14 on page 81 for more data

Driving Gage and Engine Analyzer is Versatile

Now on the market is a driving gage and engine analyzer for cars, trucks, tractors, boats, and stationary engines. Known as the Motor Minder, the unit reportedly can be easily installed on any car by using windshield or side moulding screws.

The face dial is in five colors and shows: when gasoline is being wasted; when the engine is operating most efficiently; when carburetor is out of adjustment; when ignition timing is bad; when valves are sticking, piston rings are leaking, or when other engine ills exist.

Included with the Motor Minder is an instruction booklet with analysis charts. It contains complete directions for both installation and use. *Instrument Div., Stewart-Warner Corp.*

Circle P-15 on page 81 for more data

Sludge Gun

Recently introduced is a sludge gun for the removal of harmful residue from the oil filter case. Said to make filter element changing easier and faster, the gun has been designed for long life as a service tool.

Its features include a 16-in. flexible nozzle; plated finish to resist rust and make cleaning easy; heavy duty rubber plunger to assure two-way action; and all-metal handle. *AC Spark Plug Div., General Motors Corp.*

Circle P-16 on page 81 for more data

Gasket Material

Recently developed is a soft neoprene-asbestos gasket material which is said to offer an excellent combination of heat resistance and compressibility. It also has good dimensional stability, does not corrode light metals, and is resistant to oil, gasoline, water, and anti-freeze solutions.

The manufacturer states that automotive applications are a natural for the material. It has already proven successful, for example, as the valve cover gasket on tractor engines. *Rubber Chemicals Div., E. I. du Pont de Nemours & Co., Inc.*

Circle P-17 on page 81 for more data

As Time Goes By . . .

. . . "DETROIT" Sets the Pace for Universal Joints

America's leading cars—thoroughbreds of the road—have come a long way since the first "one-lunger". During this progress, the continual step-up of engine power has increased tremendously the burdens placed on universal joints. Improvements in "DETROIT" Universal Joints have kept pace with car and truck design to help America's vehicle manufacturers achieve products of vision and initiative.

DETROIT
UNIVERSAL JOINTS

UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

What every Automobile man should know about

Power Steering

(Number 1 of a Series)

You've probably been hearing a great deal about Power Steering lately. It is attracting more attention in the automotive field than anything since automatic transmission. For the most part, comment has been extremely favorable. However, as with any new product, there have been some misconceptions due to incomplete or faulty information.

That's why we, as the world's largest producer of power and manual steering gears, are publishing this series of messages to help answer some of the questions most frequently asked about Power Steering. Let's start with a basic one.

1. IS POWER STEERING HERE TO STAY?

Definitely *yes!* No other major automotive development (not even automatic transmission) has won such rapid public acceptance. Its principles have already been perfected by years of use in heavy vehicles such as buses, trucks and road-building equipment and in ships and aircraft.

2. IS IT TROUBLE-FREE AND DURABLE?

Again, *yes!* Engineering tests over many years have proved that Saginaw Power Steering will easily outlast the average car with nothing but an infrequent adjustment or addition of oil.

3. WHY IS SAGINAW POWER STEERING *SAFER?* Saginaw Power Steering is safer because it helps you drive relaxed and tension-free. It resists and absorbs wheel-twist from ruts or chuckholes—enables you to keep your car under safe control even in case of a blowout at high speed. Saginaw Power Steering also provides quicker steering response in any emergency.

Because of its simple and sturdy construction, there's practically *no chance of power failure.* But just in case, you always have the assurance that you can guide your car by manual steering—an extra built-in safeguard that prevents any possibility of loss of control.

Another vital safety feature of Saginaw Power Steering is the comforting *"feel of the road"*—the subject of our next message.

MEANTIME—if you'd like to learn more, we'll be delighted to send you "THE *FACTS* ABOUT POWER STEERING"—an interesting little booklet we've prepared to help give you a better understanding of this important new development. It's yours for the asking—just use the handy coupon.

Saginaw Steering Gear Division
General Motors Corporation
Saginaw, Michigan (Dept. I)
Please send a free copy of "The Facts About Power Steering"

NAME _____

ADDRESS _____

CITY _____ ZONE ___ STATE _____

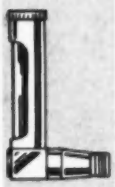
Saginaw
POWER STEERING

LOOK TO THE LEADER . . . FOR LUBRICATING DEVICES

GITS

40 YEARS' LEADERSHIP

Yes, for 40 years GITS has been setting the standard for industry . . . solving tough lubricating problems . . . earning the confidence of manufacturers . . . it's the reason people say, "Call GITS first".



LOW COST

Yes, GITS oil cups can do a complete lubricating job for you . . . prolonging bearing life, reducing maintenance costs, cutting down-time, boosting production . . . and GITS oil cups cost so little.

WORLD'S LARGEST SELECTION

Yes, only GITS can offer you such a wide range of standard stock sizes. From *just one* source you can get *all* lubrication devices in *any design* for *any purpose.*

CONSISTENT TOP QUALITY

Yes, GITS is known for uniform quality in design, materials and machining . . . this means constant, dependable performance for you. Inferior products can cost you time and money. Demand the best . . . get GITS.

Oil Hole Covers • Oil Cups • Grease Cups • Bottle Oilers • Gauges • Gravity-Feed • Wick-Feed
Constant Level • Vibrating Rod Styles • Threaded or Drive-Type • Elbow or Straight

GITS BROS. MFG. CO.

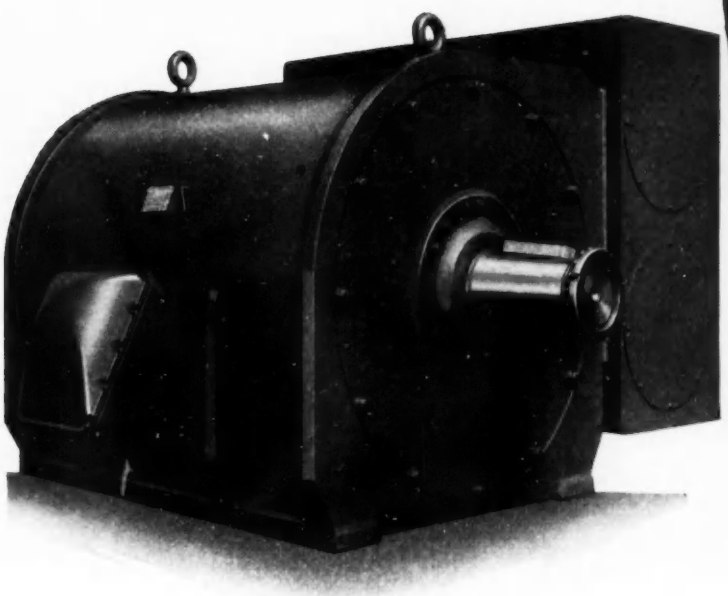
1870 S. Kilbourn Ave. Chicago 23, Ill.

Write today for Free Catalog No. 60A. Use it as your handy reference for lubricating devices.

FOR STAMPING-PRESS DUTY...

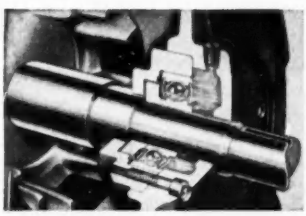
"All motors are NOT alike!"

RELIANCE *Precision-Built* MOTORS



Reliance Totally-Enclosed Force-Ventilated Motor, designed for stamping-press duty. Standard enclosures also available, with wide choice of mechanical designs and special mountings. Ratings from ¼ to 300 hp.

- ☆ **Shock-resistant frame, bracket, and shaft construction**
- ☆ **High flywheel accelerating torques . . . liberal ratings**
- ☆ **Tough, vibration-proof Reli-X insulation**



. . . AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1105-K

RELIANCE ELECTRIC AND ENGINEERING CO.

1123 Ivanhoe Road, Cleveland 10, Ohio • *Sales Representatives in Principal Cities*

If you make any parts like these . . . .

Piston Pins	Jacks
Pump Cylinders	Gun Barrel Drills
Axles (front and rear)	Axle Housings
Bearing (Races)	Propeller Shafts
Airbrake Parts	Bobbins
Drag Links	Push Rods
Table Rollers	Rocker-Arm Shafts
Exhaust Lines	Hollow Spindles
Drill Shanks	Shock-Absorber Casings
Frame Spacers	Spring Bushings
Grease Guns	Ironer Rolls
Armature Bodies	Tie Rods
Hydraulic Brake Lines	Drill Collars
Filler Tubes	Torque Tubes
Hydraulic Hoist Cylinders	Spool Holders
Ignition Wire Tubes	Golf Shafts
Radio Parts	Transmission Parts
Bushings	Spindle Caps

you can make them

better, faster and at less cost

with SHELBY SEAMLESS STEEL TUBING

BECAUSE Shelby Seamless comes to you with the basic shape and hole already made you can eliminate or greatly reduce many time and labor-consuming operations connected with boring and machining. You also save the wear and tear on expensive tools, as well as the needless waste of steel.

Another important advantage in using Shelby Seamless Tubing is that its excellent machining characteristics and uniformity speed up production and improve the quality of your output. *You can turn out parts by the millions and the last part will be as metallurgically and dimensionally accurate as the first part produced.*

Shelby Seamless Steel Tubing is available in a complete range of sizes; in different wall thicknesses; various finishes and steel analyses. Our engineers will be glad to submit recommendations based on a study of your particular requirements.

All Shelby Seamless Tubing is pierced from solid billets of uniform steel. This is the one manufacturing method that assures absolute uniform wall strength.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S SHELBY SEAMLESS MECHANICAL TUBING

USS

UNITED STATES STEEL

Another new development using

B. F. Goodrich Chemical *raw materials*

Valve made by Aero Supply Mfg. Co., Inc., Corry, Pa. Hycar rubber diaphragm molded by Vulcan Rubber Products, Inc., Brooklyn, N.Y. B. F. Goodrich Chemical Co. supplies the Hycar rubber only.
1. Completely assembled shut-off valve as used in the B-47 Stratojet. 2. Hycar rubber diaphragm in partially assembled valve 3. Hycar rubber diaphragm

"Thinking" valve needs Hycar for fast, safe refueling!

GASOLINE flow into wing tanks of B-47 Stratojets and C-124 Globemasters sometimes reaches 600 gallons per minute.

Shut-off valves—with Hycar rubber diaphragms—meet every requirement of speed and safety. Valves are located in the wing tanks. They are actuated automatically to stop fuel flow before tank capacity is reached. If the valve's rubber diaphragm were to fail under the terrific pressure, fuel would overflow . . . the fuel tank might rupture . . . the entire wing structure might be damaged. You can see the important part the Hycar rubber diaphragm has in successful refueling.

Hycar not only withstands extreme pressures, but also resists the deteriorating effects of aircraft fuel. It will not become brittle or crack with age. And Hycar also remains resilient and flexible through a temperature range required for this application of –65°F. to 167°F. The Hycar rubber is compounded to meet military specification MIL-R-6855, Class I.

Hycar rubber compounds have many advantages, are used in many industries. They resist heat and cold, abrasion, aging, gas, oil and many chemicals. They may help you improve or develop more saleable products. For information, please write Dept. HG-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

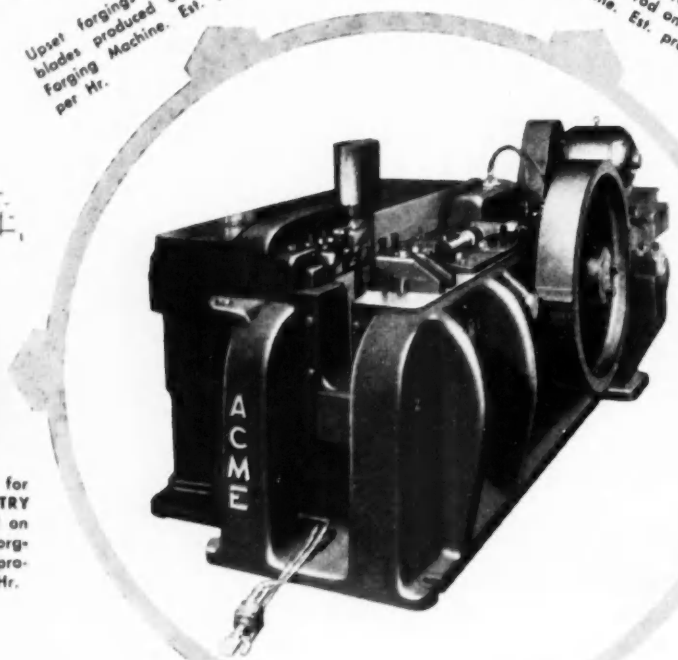
Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

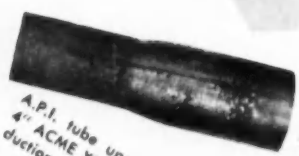
Upset forgings for **AVIATION** "Jet" blades produced on 1½" ACME XN Forging Machine. Est. production—200 per Hr.

Rear axle housing for **AUTOMOTIVE** industry forged off the rod on ACME XN 3" Forging Machine. Est. production—240 per Hr.

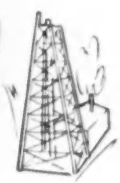
Bevel gear blank for **GENERAL INDUSTRY** forged off the rod on a 3" ACME XN Forging Machine. Est. production—250 per Hr.



Heavy clevis for **FARM MACHINERY** forged on the rod with 2½" ACME XN Forging Machine. Est. production—265 per Hr.



A.P.I. tube upset for **OIL FIELDS** from 4" ACME XN Forging Machine. Est. production—300 per Hr.



Rail anchor for **RAILROADS** forged off the bar on a 2" ACME XN Forging Machine. Est. production—550 per Hr.

...and for YOUR Business Also!

The above production figures on forged parts from ACME XN Forging Machines may suggest cost savings to you in YOUR business. Our seventy-five years of experience is always available. Your inquiry will receive our immediate attention.

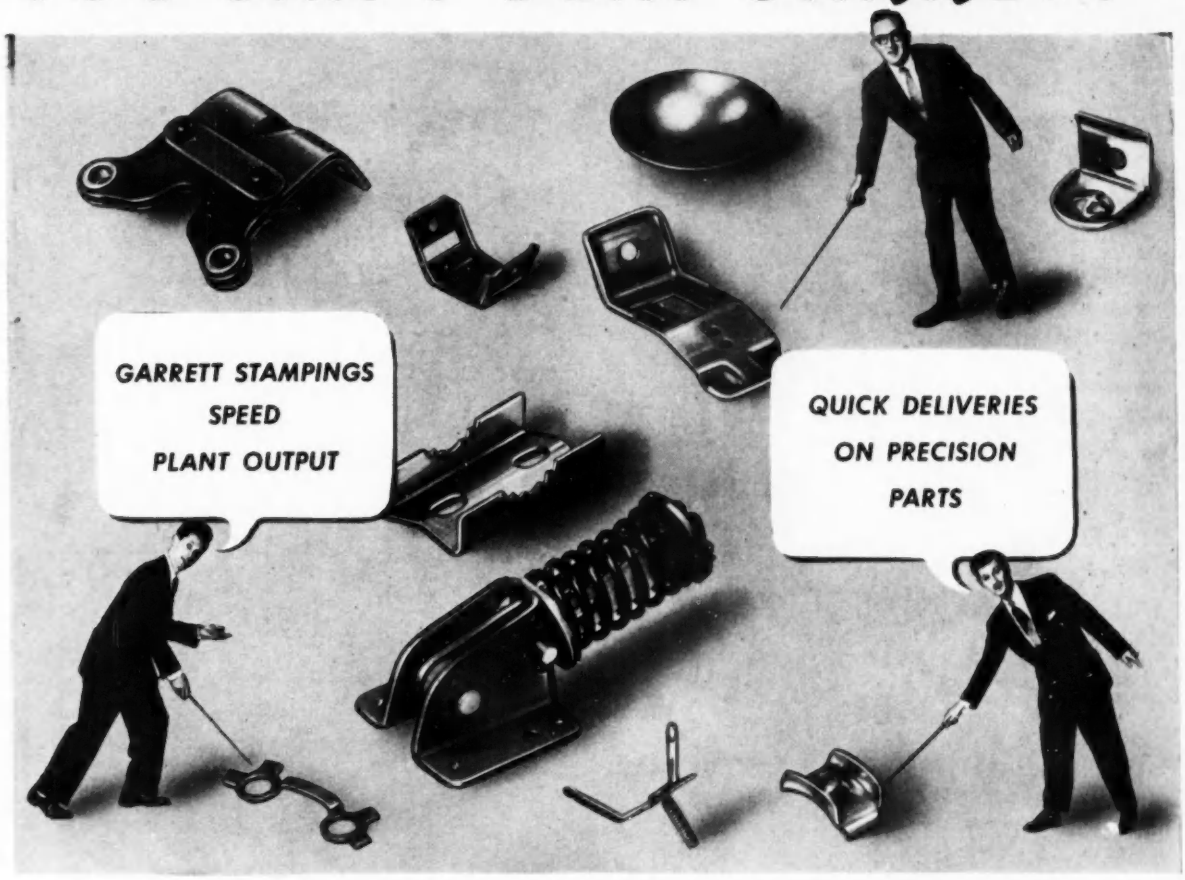
THE HILL ACME COMPANY

ACME MACHINERY DIVISION • **1209 W. 65th St., Cleveland 2, Ohio**

ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

YOU CAN'T BEAT GARRETT



STAMPINGS

Save time, trouble and expense by making Garrett your subcontractor on small and medium metal stampings. Garrett has the "know-how" to meet your most rigid specifications. Three modern plants, automatic high-speed presses up to 150-ton capacity, and up-to-date tool shop provide highest quality of workmanship. Finishing equipment includes tumbling, polishing, sand blasting, heat treating and plating.

To speed production, reduce costs, improve quality, make Garrett your headquarters for metal stampings.

IMMEDIATE DELIVERY FROM STOCK

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SPRING LOCKWASHERS
Greater holding power, with controlled tension for tighter assemblies. Wide choice, plated to your needs. Delivery from stock.

FLAT WASHERS
Most complete line of washers in the world. To all civilian and Armed Forces specifications.

HOSE CLAMPS
AIRCRAFT AN737 Stainless steel radial type

MULTI-CLAMP (QS100 & AN748) worm type screw hose clamp

AUTO-SEAL the inexpensive high quality hose clamp

Garrett
OF PENNSYLVANIA

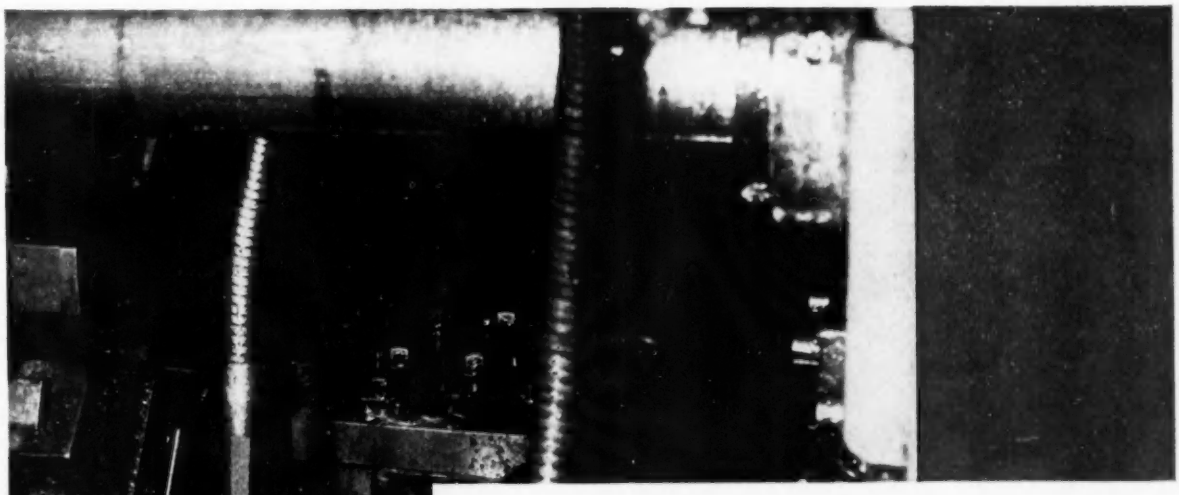
GEORGE K. GARRETT COMPANY, INC. PHILA. 34, PA.

Congratulations and good luck to every member of the Ford Motor Company!

HH

HOUDAILLE · HERSHEY CORP.

1500 FISHER BUILDING • DETROIT 2, MICH.



ANTISEP ALL-PURPOSE BASE

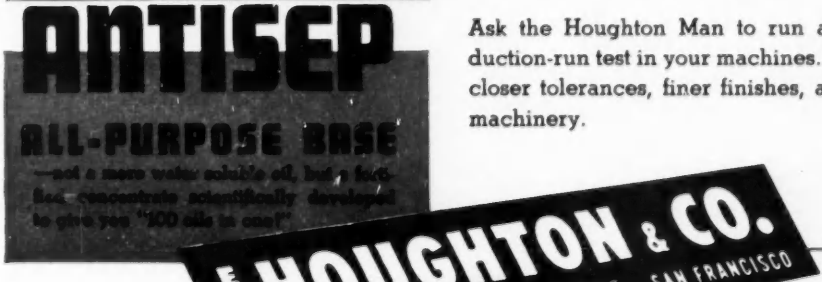
users needn't worry about

SUMMER SHUT-DOWNS

Houghton's heavy-duty Antisep All-Purpose Base, in addition to its phenomenal cutting qualities, possesses rust preventive ability. That means you can shut down machines using Antisep A. P. Base with no fear of rusting machine parts during summer vacations. In addition, Antisep A. P. Base has high antiseptic ability. That means no bacterial growth, no odors during machine shut-downs.

Antisep All-Purpose Base is not an ordinary water-soluble cutting oil! It is a heavy-duty, fortified cutting base containing emulsifiers that make it soluble in water! Even in dilutions of 25 to 1 it provides lubricity, anti-welding, film strength, and antiseptic properties equal to expensive oil-mixed bases—and it costs only 8c per gallon in the machine!

Ask the Houghton Man to run an Antisep A. P. Base production-run test in your machines. You'll get better production, closer tolerances, finer finishes, and complete safety for your machinery.



E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

NOW!

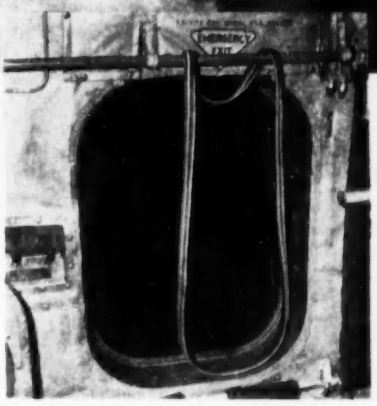
A new class of

G-E SILICONE RUBBER...

still flexible after 24 hours at −120° F!

A new low-temperature silicone rubber (SE-550), just announced by General Electric, now combines high strength and elongation *with maximum low-temperature usefulness*. Now you can specify silicone rubber for applications at lower temperatures than ever before possible. SE-550 shows practically no increase in modulus at −100° F and retains useful flexibility below −120° F.

SE-550's low-temperature flexibility is achieved without sacrifice of *high-temperature resistance* or any of the other desirable properties inherent in silicone rubber. It has good compression set and excellent electrical properties.



New G-E silicone rubber (SE-550) remains flexible after 24 hours at −120° F, does not stick to metal after long inactivity. Hence it is specified for gaskets for emergency hatches (shown here at −50° F), astra domes and access windows on the Douglas Globemaster. Manufactured for Douglas Aircraft Company, Inc., by Los Angeles Standard Rubber, Inc.

Or is HIGH HEAT your problem?

Automotive and railway design engineers find the extraordinary *heat* resistance of G-E silicone rubber ideal for many applications. Spark plug boots and supercharger gaskets are typical uses of this versatile engineering material which resists temperatures of 500° F—in some cases, up to 600° F.

G-E silicones fit in your future

GENERAL ELECTRIC

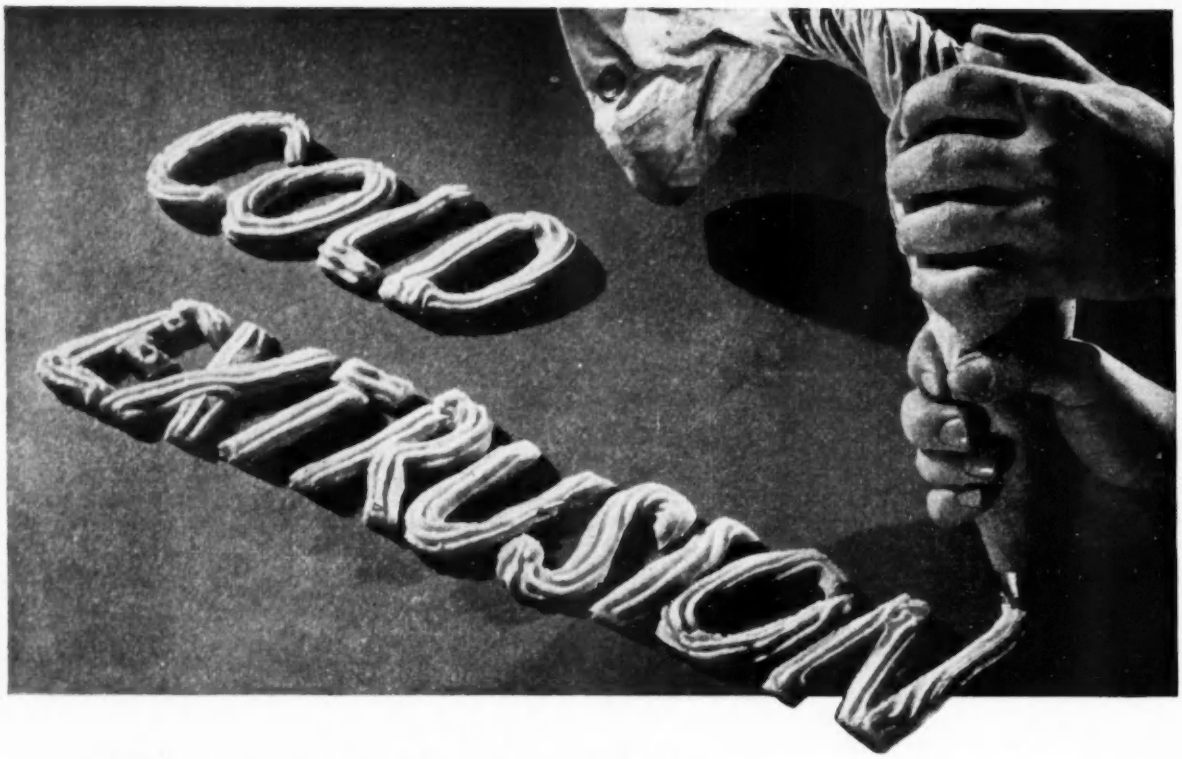
CLIP AND MAIL TODAY!

General Electric Company
Section 351-4C
Waterford, New York

Please send me product data on SE-550 silicone rubber, including a free copy of *Imagineering with Silicone Rubber*. I am interested in G-E silicone rubber for:

( ) Seals and gaskets
( ) Wire and cable insulation
( ) Tapes and cloths
( ) Sponged products
( ) Belting
( ) Boots, sleeves, bellows
( ) Hose and ducting

Name_____
Firm_____
Street_____
City_____ Zone___ State_____
(In Canada, mail to Canadian General Electric Company, Ltd., Toronto)



Bonderite and Bonderlube can help you get economical mass production of metal parts

Key to the new technique of making metal flow is the lubrication system provided by Bonderite and Bonderlube. Bonderite puts a dense, non-metallic phosphate coating over and integral with the metal. Bonderlube reacts with the Bonderite to form an amazingly efficient lubricant that allows greater flow of metal than ever before with higher production, better product, and lower cost.

Bonderite and Bonderlube installations today are helping many manufacturers do "impossible" things by cold extrusion. Applications are in both defense and civilian work.

Take advantage of the proven products, Bonderite and Bonderlube. Take advantage, too, of the exclusive flow of information from Metallgesellschaft, Parker's German affiliate, supplementing the long experience of our technical staff in the application of this new technique. Call us in on your cold extrusion problems.

Parker *Since 1915— leader in the field*

PARKER RUST PROOF COMPANY
2178 E. Milwaukee, Detroit 11, Michigan
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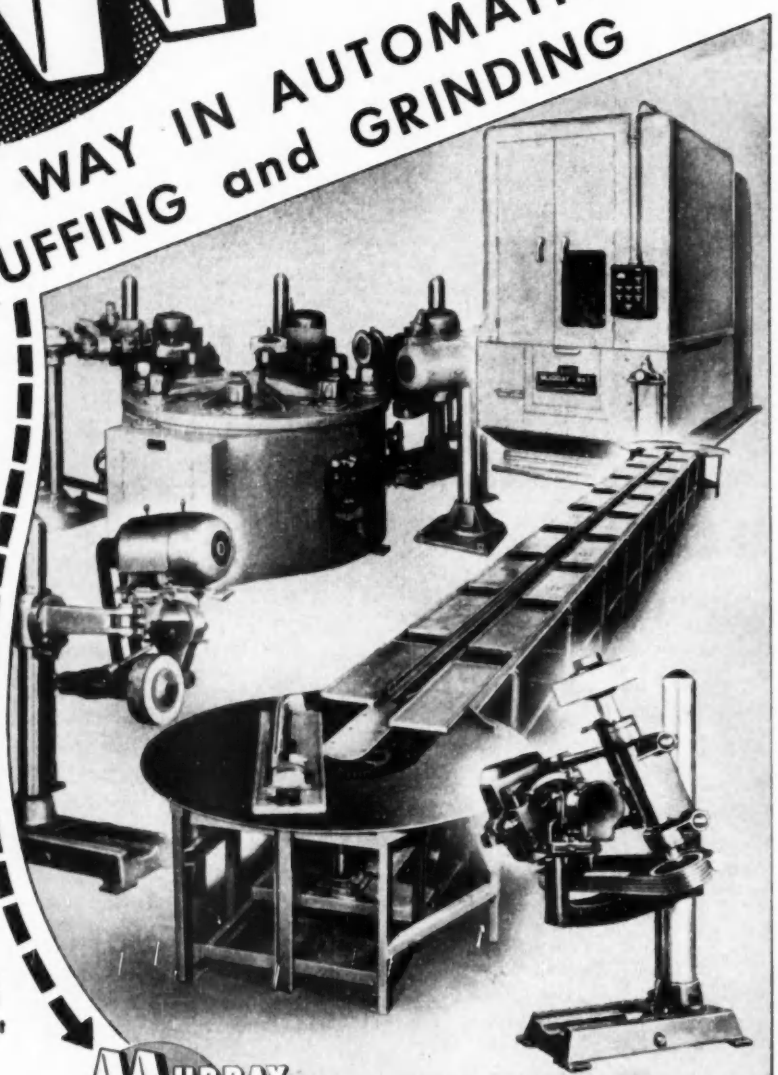

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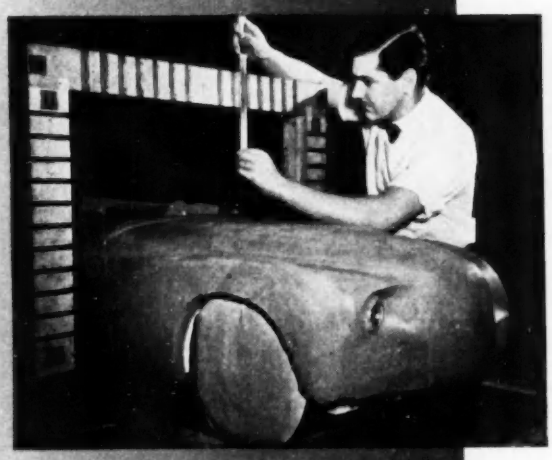


They're working on 195X models...

and we're engineering the valves for them

Since the birth of the industry, Automotive Engineers have never ceased to search for new ways and new materials to make internal combustion engines constantly better.

Since 1901, Thompson Products, Inc. has accepted the responsibility for keeping valve designs and valve materials ahead of the progress being made by the automotive industry.

We intend to maintain that leadership.

VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

Which Carburizing Grade of Tubing Is Best for You?

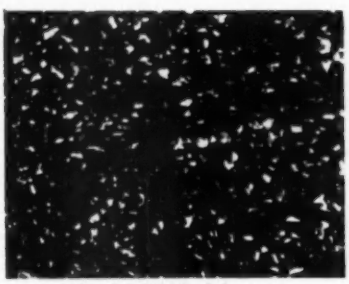
...B&W Can Supply Them All

When you want to carburize for hard surface and at the same time maintain a tough core, it is wise to examine all available carburizing grades to determine which is most suitable for your specific operation. The low-carbon alloy steels listed are typical of those designed for ease of carburization.

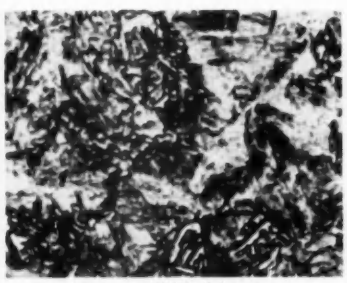
After carburizing, the steel has a high carbon content on the surface and only the carbon content of the base alloy in the core. This provides, after suitable heat treatment, a surface which is hard and wear resistant and a core that is tough and ductile—a combination desired in many applications. Alloying elements impart an ability to develop a deeper case for a given set of carburizing conditions and provide a more gradual transition in microstructure and hardness from case to core than in a plain carbon steel.

In the application of these low-carbon alloy steels it is possible, in many instances, to use alternate grades without loss of desirable mechanical properties. Discuss your requirements with Mr. Tubes—your nearby B&W Tube Representative. You'll find B&W Bulletin TDC-149 helpful, too. Write for it.

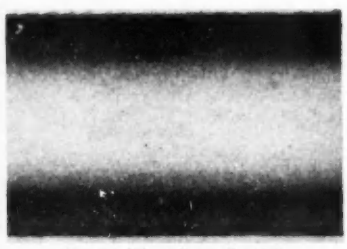
TYPICAL GRADES
1320
2317
2515
3120
E3310
4023
4320
4620
4815
5120
6120
8620
8720
E9310



Microlat 1000X of the case



Micro at 1000X of the core



Macro of the tube wall at 5X

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

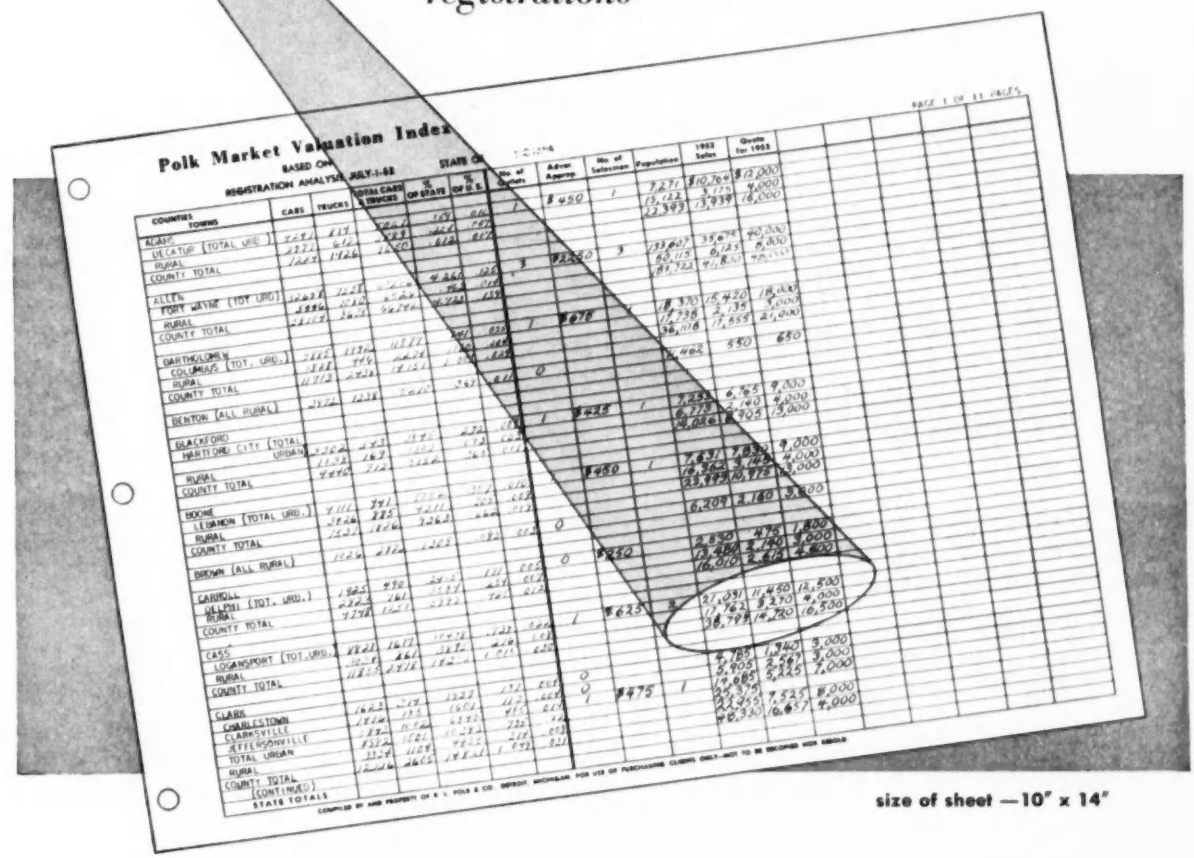
B&W SEAMLESS and WELDED TUBES

TA-1746 (C)

Focus on FACTS

Compare YOUR business, market by market, city by city, with official car and truck registrations

Use new Polk work-sheet forms which show number of cars and trucks in operation as of July 1, 1952, for each urban post office town, arranged by county and state, and printed on special 10" x 14" worksheets with column headings under which you can post your own sales figures. Write, wire or phone for information on how these new control sheets can increase your profits.



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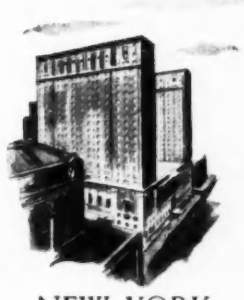
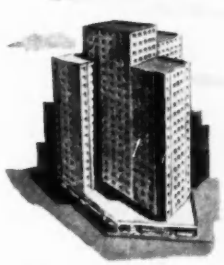
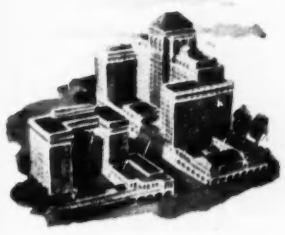


NEW YORK
Hotel Commodore

BOSTON
Parker House



PITTSBURGH
Carlton House



ATLANTIC CITY
Chalfonte-Haddon Hall

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Advertisers

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TUTHILL MODEL L Pumps are Designed to Meet Your Small-Pump Replacement Needs

MODEL L
For lubricating, hydraulic, transfer, circulating, burning oils service. Built in 5 sizes.

The Tuthill Model L is the pump that introduced the first practical mechanical seal for leak-free performance and low power consumption. This compact, efficient positive displacement internal-gear rotary pump is offered in the following types to fit the pump to the need—in capacities from ⅓ to 6 g.p.m. and pressures to 600 p.s.i.

MODEL LD
For burning oils service. Flanged ports, 3-bolt mounting. Built in 3 sizes. Available also with built-in ball bearings as Model LDK.

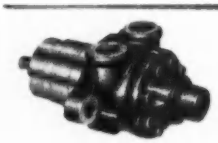
MODEL LF
For lubricating service. Flange mounting without shaft seal. Choice of internal or external porting. 3 sizes.

MODEL LH
For hydraulic service. Pressures to 600 p.s.i. 4 sizes.

MODEL LK
For lubricating, hydraulic, transfer and circulating service. Built-in ball bearings. 4 sizes.

MODEL LPV
For lubricating, transfer and circulating service. Built-in adjustable by-pass valve. 3 sizes.

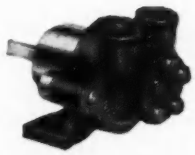
MODEL LSA
Stripped pump for built-in applications in lubricating, hydraulic, transfer and circulating service. Includes Model L cover, idler gear and rotor. 5 sizes.



MODEL RL
Automatic reversing feature permits driving pump in either direction without changing direction of flow or changing port positions. For lubricating and hydraulic service. 3 sizes.

Write for Catalog No. 101 on Model L pumps. Also ask for Tuthill Pump Guide on complete line of Tuthill pumps.

TUTHILL
PUMP COMPANY
939 East 95th Street, Chicago 19, Illinois
Canadian Affiliate: Ingersoll Machine & Tool Company, Ltd.
Ingersoll, Ontario, Canada



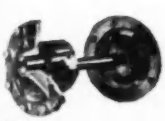
TUTHILL MODEL L Pumps
For pressure lubrication. For hydraulic mechanisms. For oil burning service.

TUTHILL MODEL C Pumps
For liquid transfer on non-corrosive liquids and for circulating service.

TUTHILL MODEL CK Pumps
Ball-bearing construction for hydraulic service.

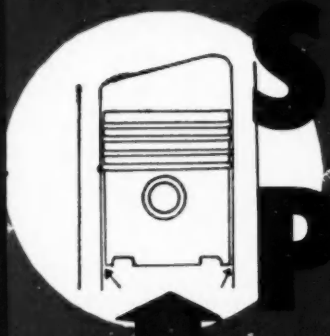
TUTHILL MODEL M Pumps
For coolant service, with automatic internal by-pass.

TUTHILL MODEL R Pumps
Automatic reversing pumps, for lubrication service (Model RC—non-relieving). For coolant service (Model RM with automatic internal by-pass).



TUTHILL MODELS S and SA Pumps All standard models are available in stripped form for building into the design of your equipment. Model S provides pump without mounting bracket; Model SA includes pumping elements only.

Write for details



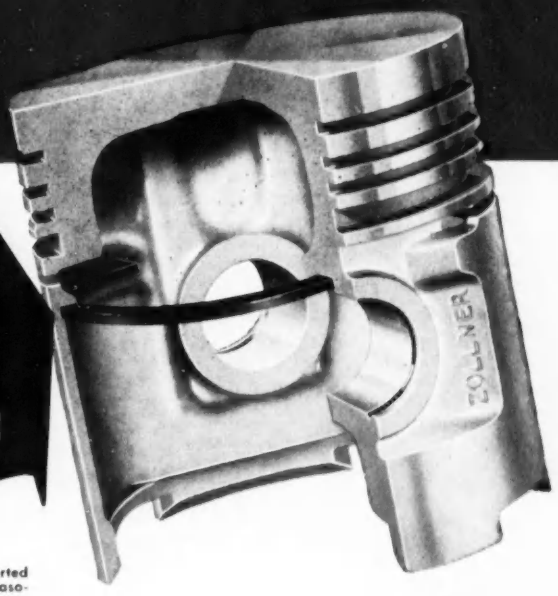
SPECTACULAR PERFORMANCE

UNIFORM EFFECTIVE SKIRT CLEARANCE AT ALL TEMPERATURES

ZOLLNER CLEAR-O-MATIC* PISTONS

*T. M. Reg. Pat. App. For

STEEL TENSION MEMBER
Anchored only at pin bosses and cast in positive contact with I. D. of piston skirt
Controls Clearance Automatically



Design adaptable to full skirted or slipper-type pistons for gasoline engines for every purpose.

Heralded by engine builders everywhere as sensational, the Zollner developed CLEAR-O-MATIC Piston *reduces required clearance to less than .001 with positive uniformity of skirt bearing under all temperatures.* The steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. Spectacular in performance, the CLEAR-O-MATIC Piston results in a *quiet engine with no cold slap, reduced friction without loss of durability or heat conductivity.* We suggest an immediate test of these advantages in your engine.

1. Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
2. Effective expansion identical with ferrous cylinder.
3. Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
4. Normal diametric clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

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- ADVANCED ENGINEERING
- PRECISION PRODUCTION in Cooperation with Engine Builders

***The Original Equipment* PISTONS**

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